PERFORMANCE / BUILDING / UPGRADING / GAMING

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atomic

MAXIMUM POWER COMPUTING

Issue one

DEATHMATCH!

Pentium 4 vs. Athlon DDR
Duel for your dollars

FREE
atomic T-Shirt
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PLAYSTATION 2

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GEFORCE2 ULTRA

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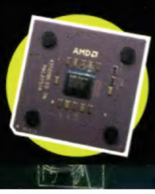
OVERCLOCK DURON

p46 WITH A PENCIL!



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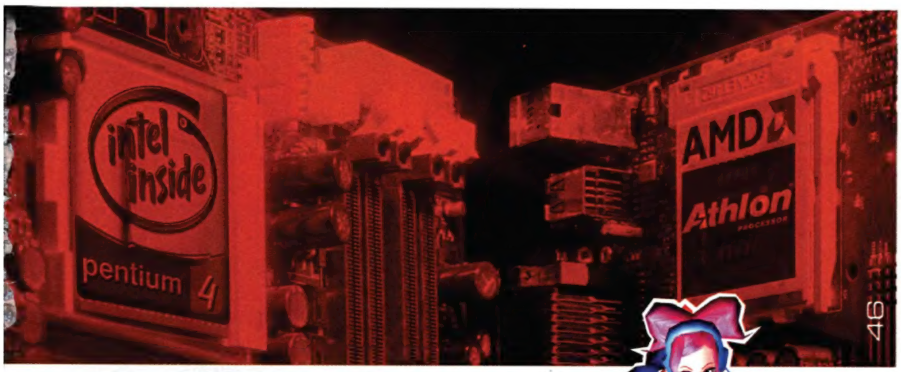
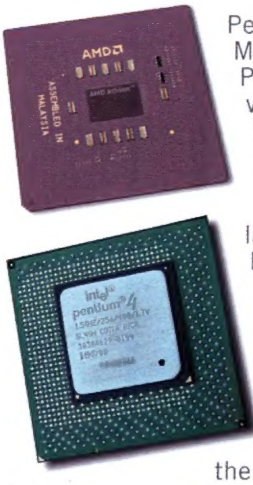
10 x Sacrifice
4 x Logitech iFeel mice
1 x Yamaha CRW2100EVK
This lot's worth almost $3,000!



2001: PC WARS
Pentium 4 vs. Athlon DDR



Pepsi vs. Coke. McDonald's vs. Pizza Hut. S-Club 7 vs. the Spice Girls. Harrison Ford vs. Bruce Willis. It never ends. Or does it? In the latest decisive Battle of the Titans, friendly rivals AMD and Intel have a go. And so do we. In the left corner is Intel's Pentium 4 RAMBUS, in the right corner is upstart AMD's DDR Athlon. We throw both to the atomic lab rats and, would you believe it, a clear winner emerges. But who wins? WE DECIDE!

ⓘ AMD's Athlon CPU and the Pentium 4 chip. Note that the Athlon is on top. Not that we'd give the game away in the contents page!

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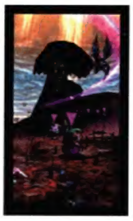

Fall Out 98

Every mag has a funny last page. Ours, we believe, is funnier than most

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56% increased attractiveness
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and 47% less friends.
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Sitting in a cardboard box, somewhere in our office, is your FREE atomic T-SHIRT! All you need to do to make us get it out of the box and send it to you is post the form on page 8.

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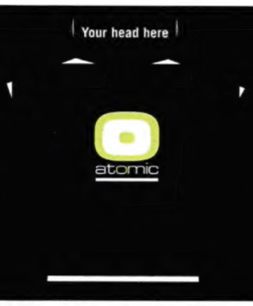


atomic editorial v1.0

Computers are cool. You may have just discovered this, or have been enlightened for many years now. Either way, if you love the machine you'll love atomic.

We are the first, true, hardcore PC magazine. Amongst the plethora of 'PC WomensDay' mags, and in the face of the internet (the only hardcore hardware source until now), we emerge. Here we are, then, a new magazine. All new, in fact. You see, we're only going to cover what we think is cool in the world of computers – so, we're trusting that you have tastes similar to ours...

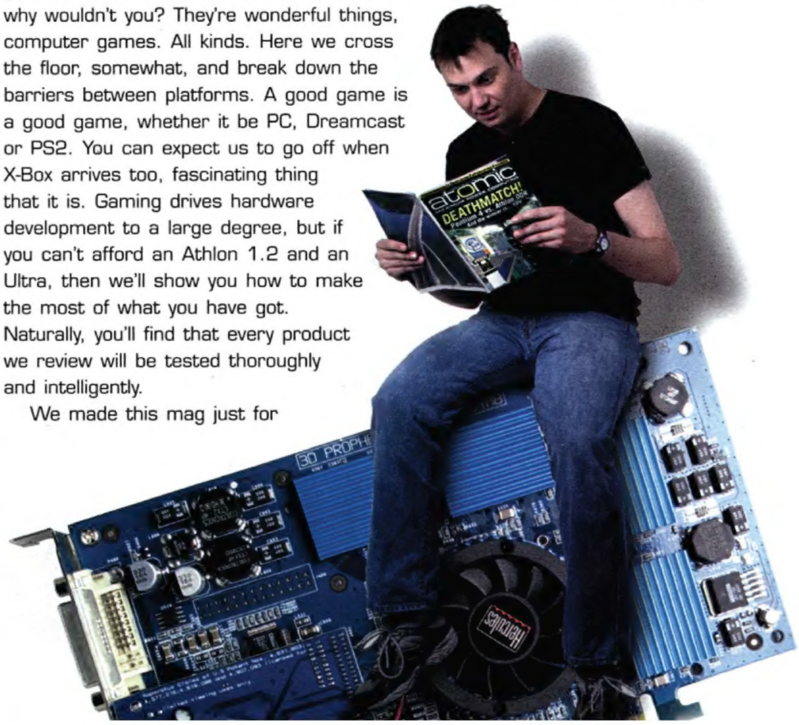
Unless it's black, we don't think you ever buy off-the-shelf PCs. Instead you upgrade at the component-level as more power and speed is needed, or becomes available, or just for the hell of it. You know your box well, but want to know it all, to stay on top. You don't just stop at slotting in that new CPU or video card – you'll overclock and tweak the sucker to within a Hertz of its life. And, we hope, you'll turn to us for help with knowing what to buy, and then, how to mess with it.

Turning your PC into a high performance box is only half the fun – what you do with your new-improved beast is, really, the point of it all. Which is why we talk lots and lots about games. We like games, we do. And so do you, because, well – why wouldn't you? They're wonderful things, computer games. All kinds. Here we cross the floor, somewhat, and break down the barriers between platforms. A good game is a good game, whether it be PC, Dreamcast or PS2. You can expect us to go off when X-Box arrives too, fascinating thing that it is. Gaming drives hardware development to a large degree, but if you can't afford an Athlon 1.2 and an Ultra, then we'll show you how to make the most of what you have got. Naturally, you'll find that every product we review will be tested thoroughly and intelligently.

We made this mag just for you, so don't hold back if you want to tell us anything. There are email addresses all over the place in this mag, send us a letter for the letters page, ask us a question for I/O, abuse us or just say hi.

Hey! Where's the CD? Guess what? There isn't one! We figured you'll have downloaded and become bored with whatever we could put on a CD by the time the mag gets to you. This also means a bit of bonus good news for you; we can keep the cost of the mag down to just 5 cents less than 6 bucks. This generosity extends to our subscription deal, $39 for an entire year... hello! Another comfort for you is that we're Australian. All our stuff is original and relevant — no overseas mag reprints in our precious baby. This is atomic, maximum power computing. Have fun!

Ben Mansill, Editor



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atomic **welcomes all information on new and upgraded products and services for possible coverage within the news or reviews pages. However, we respectfully point out that the magazine is not obliged to either review or return unsolicited products. The editor is always pleased to receive ideas for articles, preferably sent in outline form, with details of author's background, and - where available - samples of previously published work. We cannot, however, accept responsibility for unsolicited copy and would like to stress that it may take time for a reply to be sent out.**

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Short Circuits

◂ **Microsoft has announced that Micron will supply DDR RAM for the upcoming X-Box. This comprises 64Mb of 200MHz DIMMs delivering 6.4Gb per second memory bandwidth to the console.**

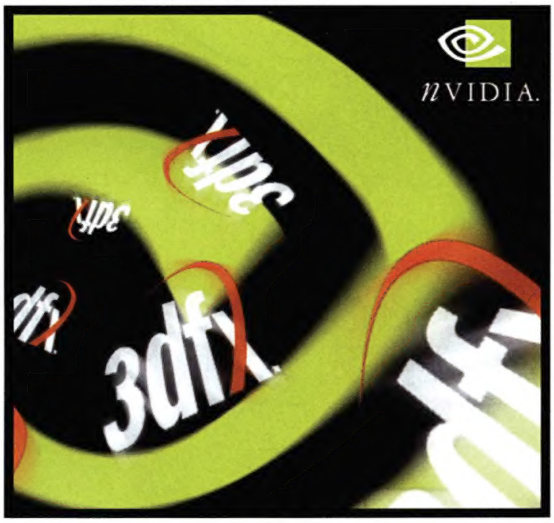
◂ **Sega have recently announced an agreement with Motorola to develop games for their next generation mobile phones. The phones have inbuilt functionality to download applications and feature high-resolution graphics capabilities. They should hit the streets in the US and Canada in the first half of this year.**

◂ **The 14-year-old high score record for the arcade game Centipede was finally broken in November. During a 9-hour marathon, Centipede addict Donald Hayes managed to score 7,111,111 points, a clear 1.6 million points above the old record.**

◂ **European company Plastic Logic has developed a way of making flexible plastic circuits. By printing this plastic onto a polymer substrate a flexible roll of chips can be produced which can then be applied to a variety of surfaces like clothing.**

◂ **IBM and Infineon have announced plans to develop yet another type of RAM, known as MRAM, which uses magnetic charges rather than the traditional electronic ones to store information. This reduces power consumption as well as possibly leading to "instant on" computers.**

R.I.P. 3dfx, thanks for the good times



Hot on the heels of the cancellation of the Voodoo5 6000 comes the shocking news that NVIDIA are purchasing the core assets of 3dfx. Core assets includes; according to the head NVIDIA PR head Brian Burke, "...patents, patent pending applications, trademarks, branding, and inventory related to the graphics business..." – basically anything of worth within 3dfx, leaving the trash behind for 3dfx management to sell off.

The key word here is patents – 3dfx and NVIDIA have been in a vicious catfight in the US courts since 1998 regarding patent infringements, each claiming the other guilty of such offences. With one of NVIDIA's patents being "Method and apparatus for accelerating the rendering of images" it is clear that much of this battle had no grounding in logic.

For the small fee of US$70 million plus 1 million NVIDIA shares (valued at US$42 each 14th December) NVIDIA must be breathing a rather long sigh of relief. They have effectively closed the book on every lawsuit 3dfx had pending, which, if they had lost, would have cost them a lot more than the purchase price of 3dfx. They certainly didn't buy 3dfx for its business performance, as 3dfx recorded net losses of US$291 million in the nine months prior to the end of October, not exactly 'must-buy' material.

3dfx are now wrapping up all operations, with the status of staff and product support still hanging. Due to the fact that most of the 3dfx staff are soon going on permanent vacation, we unfortunately predict that support levels are going to taper off to zero in the coming months, so purchasing a new 3dfx card is not a wise decision, although bargain hunters on a budget could score well. The buyout by NVIDIA should also be the final nail in the Glide API's coffin, and possibly the beginning of the end for openGL, as NVIDIA are beginning to focus more on Direct3D.

There is a distinct possibility that the technological innovations the graphics market has seen as a result of the rivalry between NVIDIA and 3dfx over the past few years may stagnate. Some believe ATI and Matrox don't have the capacity to compete with NVIDIA, but then again many said the same of NVIDIA eighteen months ago when 3dfx were still on top, so we will be keeping a close eye on these two companies.

We all have fond memories of the first time we saw a 3D accelerated game in action, and the chances are it was a 3dfx card powering the action. It will be a sad farewell to the company that brought 3D acceleration into the mainstream, and changed forever the way we play games on our PCs. See p.70 for more information on the last few months of 3dfx's life.

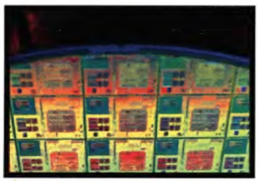
Alice's trip to Hollywood

American McGee's Alice has received widespread acclaim for its amazing level design and twisted view on the Alice in Wonderland children's story. Many are going so far as to call it a piece of art, whilst others claim it is as close to a bad trip as you can get without actually attending a doof. Dimension films have snapped up the rights to the flick, after visiting Electronic Arts' studios regarding the film rights to another EA game. During that visit, the representative from Dimension bumped into American, who turned out to be an old friend. After seeing the sketches and artwork for Alice whilst in American's office, the rep took the trailer of Alice to Miramax chief Bob Weinstein. After seeing the trailer, McGee claims Weinstein slammed his fist down and exclaimed "We are making this movie". Miramax lawyers in the room suggested he discuss this with the board, to which he agreed. Weinstein then proceeded to close his eyes and hold his hands to his temples for a few seconds. He then opened his eyes and proclaimed "Ok, board meeting over, we're making the movie". Alice is slatedto be directed by Wes Craven (Nightmare on Elm Street, Scream), and written by John August (Go, Charlies Angels).

ⓘ The Wonderland in Alice is definitely from Disney.

AMD Silicon breakthrough

With AMD's recent Athlon and Duron range of processors running at relatively high temperatures, heat dissipation has become a major factor limiting speed increases for these chips. Enter a small American company by the name of Isonics. They have replaced the normal silicon wafers that chips are created on with an 'enhanced' isotopically pure silicon wafer, which can help the CPU dissipate heat at up to 60% better than a natural silicon wafer. An unnamed microprocessor manufacturer (most likely AMD) has tested 1GHz CPUs with this material and found an amazing 35C decrease in peak temperatures. This material is cheap to manufacture (approximately US$10 per wafer) and can be used in existing manufacturing processes without any changes. Unconfirmed reports are beginning to surface from AMD's FAB25 plant that a 1.5GHz Palomino has been tested using this material WITHOUT A FAN ATTACHED TO THE HEATSINK! Isonic hope to enter a licensing agreement regarding this technology on or before April 30, 2001, which interestingly enough is just before AMD plan to release the Palomino microprocessor.



ⓘ A Silicon Wafer from AMD chips.

Post Apocalypse

Got any comments on atomic? Any rants, raves, criticism, praise? Then let us have it. Send us your words of wisdom, of course, thanks to Microsoft our favourite letter each month will win a Sidewinder Game Voice and a Strategic Commander.

post@atomicmpc.com.au

atomic **Post Apocalypse, PO BOX 275, BEACONSFIELD, NSW 2014**

Short Circuits

In what is seen as an emerging powerhouse in the Australian gaming community four of the country's biggest LAN groups are combining to form AusGamers, the Australian Gaming Network. Combining the resources of Multiplayer United (NSW), Shafted (VIC), Queensland Gamers League (QLD) and WonderLAN (SA), this service will be not restrict itself to LAN events, rather support all facets of the Australian gaming community.

We went along to one of the recent Multiplayer United events in Sydney to get a closer look at the event. With a multitude of competitions and over 200 people in attendance the venue was a hive of activity. These events just keep getting bigger and bigger, and with the creation of AusGamers we envisage a new era of network gaming. The site can be found at -

www.ausgamers.com

ⓘ MPU draws a wide range of gamers to it's LANs.

ⓘ Excessive lanning may lead you to look like ubergamer Blitz

Short Circuits

◂ **In what has been seen as an almost inevitable announcement Sierra Studios have confirmed that Gearbox Software will be bringing Half-Life to the PS2. Currently working on Half-Life for the Dreamcast, the PS2 version of Half-Life will feature extra single player levels as well as enhanced multiplayer content. The game is due to ship second quarter 2001.**

◂ **Lucasarts and Verant Interactive, makers of Everquest, are officially combining to create Star Wars Galaxies, a persistent massive multiplayer online game. Information on the game is scarce at the moment, but it is due sometime in 2002. The website is running at** www.starwarsgalaxies.com

◂ **Amidst a flurry of rumours about Freelancer's cancellation, Microsoft has announced its intent to purchase its developers Digital Anvil. Freelancer, the ambitious multiplayer space combat game, will still be going ahead but with Chris Roberts as creative consultant rather than managing development.**

◂ **In a true example of big fish swallowing smaller fish, Hasbro Interactive, renown for its purchase of MicroProse, has entered into a "strategic agreement" with Infogrammes. Of course, this agreement involves the purchase of 100% of Hasbro's common stock by Infogrammes.**

180Gb on one Hard Drive!

Just when you thought you couldn't possibly need a bigger hard drive, Seagate have released the world's largest single disk hard drive. The Barracuda 180 provides a massive 180GB of space for all the warez, pr0n and mp3 rips that you could ever need - at least for the next six months anyway. Spinning at 7,200 rpm, it has a peak transfer rate of 47MB/s and utilises the industry standard Ultra160 SCSI interface. Expect the Barracuda to hit the streets in Q1, 2001.

ⓘ The Barracuda 180, a huge leap forward in hard disk technology.

Lose the Force, Luke

In an announcement that has seen a horde of fans up in arms, and with potential ramifications throughout the PC games community, LucasArts have announced that Star Wars: Obi-Wan would not be coming to the PC. The game in now scheduled to be released on "next generation consoles".

Obi Wan is the spiritual successor to Jedi Knight, although it differs in many ways. The most noticeable of these are that the main character is Obi-Wan Kenobi himself, and that the action takes place entirely in third-person. This shift in perspective was designed to incorporate the new glyph system, in a throwback to the cult classic Die by the Sword, is an intuitive means of weapons control which allows mouse movements to be translated into lightsaber thrusts and parries.

The cancellation of the PC version is seen as a big blow for LucasArts, a company once deemed to be able to do no wrong. It remains to be seen how widespread the fallout from this will be.

IBM's super high resolution monitor

IBM has successfully shipped the worlds highest resolution monitor, at two hundred pixels per inch. The 22" active matrix liquid crystal display contains over nine million pixels, making it twelve times sharper than current displays and four and half times sharper than the best high definition televisions. An initial prototype was shown in 1998, with many industry analysts believing it couldn't be mass produced until at least 2010. The technology isn't exactly affordable yet. The monitor is currently being used with IBM's ASCI White supercomputer, most likely because it's the only machine on Earth capable of moving so many pixels at once.

ⓘ IBM pushes the big picture.

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PC Quakers pimp-slap the Dreamcast crowd

Those naughty hackers have been at it once again. January was the official date for the Dreamcast Quake III Arena maps to be released on PC, thus allowing PC and Dreamcast players to face off online. But a hacker named StoneDonkey obviously couldn't wait, and has ripped and converted the Dreamcast exclusive maps, distributing them via the Internet to PC Quakers worldwide. The folks at id were not happy, saying "...the legal way to play it is to go out and buy the DC game, not download it from an illegal warez site."

ⓘ DC Quake 3 goes PC

Swooshing those mp3's

If you're in the market for a funky new portable mp3 player, Nike's new psa[play 120 (don't ask us why there's a square bracket in there!) might be just the ticket. Sporting 64MB of memory, a snazzy LCD remote and more Nike Swoosh's than an American basketballer would know what to do with, the psa[play 120 is definitely the yuppie's mp3 player of choice. We tried it for a couple of days and found the sound quality to be exceptional, with an even higher "check out my new mp3 player - WOW!" rating.

ⓘ The perfect fashion accessory for the fabled "athletic computer user".

Optus users get international bandwidth boost

In November of last year huge disruption was caused to Telstra internet customers when the SEAMEWE3 communications cable that links Australia, Asia and Europe which was sliced in two somewhere off the coast of Singapore by what is believed to be a ship's anchor. In the same week the new pipeline to the United States, Southern Cross undersea cable officially went online.

Southern Cross cable features a 120 gigabit per second link between Sydney and Hawaii and a 160 gigabit per second link between Hawaii and the West coast of the USA. The cable is 30,500km in length and dives up to 7,585km depth. This pipeline will be used by Optus to significantly increase their connection to the USA, and provide a huge leap in network performance. Upon Southern Cross going live Baldo Sutich, CEO / President of Southern Cross Cable Network, stressed the importance of this new cable: "We can now expect to see large scale uptake of broadband access, enabling users to fully utilise technologies such as video and audio streaming."

What's HOT

AMD
For the intel-igent CPU buyer

Codename Eagle Multiplayer
The only game with formation skydiving from a Zeppelin

Vodka and Red Bull
Translucent yellow and packing a punch

Dreamcast
Receiving a new lease on life...

DDR
Low cost and high speed give a new lease on life to the Athlon

Counter-Strike
Free mod hits the big time...

Nuclear Power
Small, clean and packing a punch

What's NOT

VIA CyrixIII
No cache and no hope

Carmageddon TDR 2000
The joke wears thinner...

iMac
One mouse button

PS2
Waiting patiently for better games...

RDRAM
It may be blue, but it stills costs the earth...

Quake 3: Team Arena
The community can only wonder why they have to pay....

Solar Power
Causes cancer

Win over $3000 of prizes!

≥ page 75 - Comps page
1 x Yamaha CRW2100EVK - worth $749
10 x B-17: The Mighty Eighth - worth $89.95 each
4 x Logitech iFeel Mice - worth $99.95 each
10 x Sacrifice - worth $89.95 each

≥ page 13 - Hot Box
2 x 12 month atomic subscriptions - worth $36 each

PLUS more prizes in our Letters and I/O pages next month! Write to us now at: post@atomicmpc.com.au

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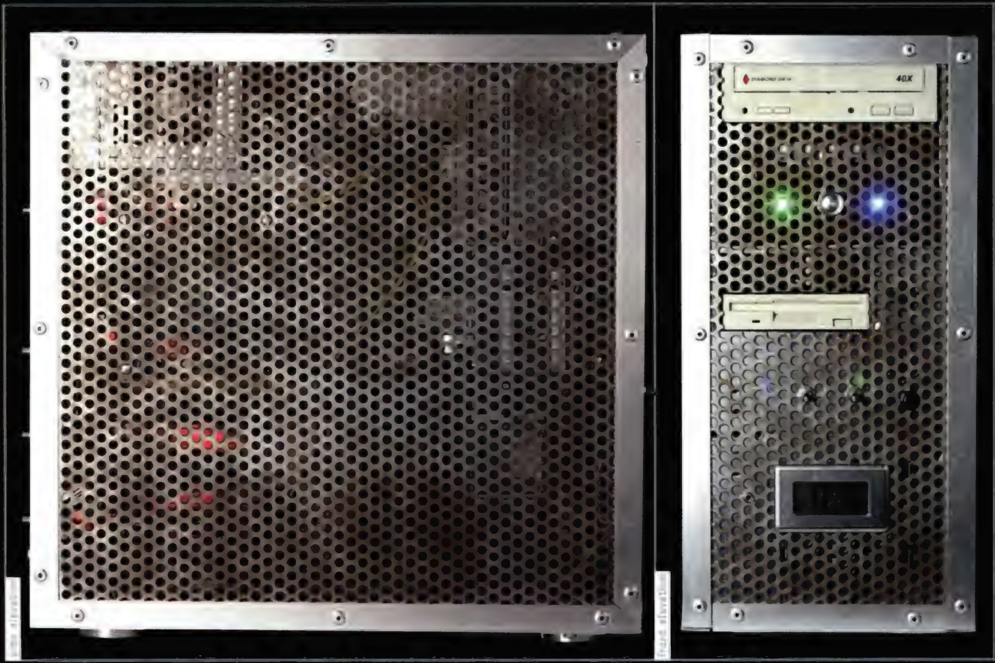


Builder: Adam Beadsmoore aka "Strange1"

Age: 18

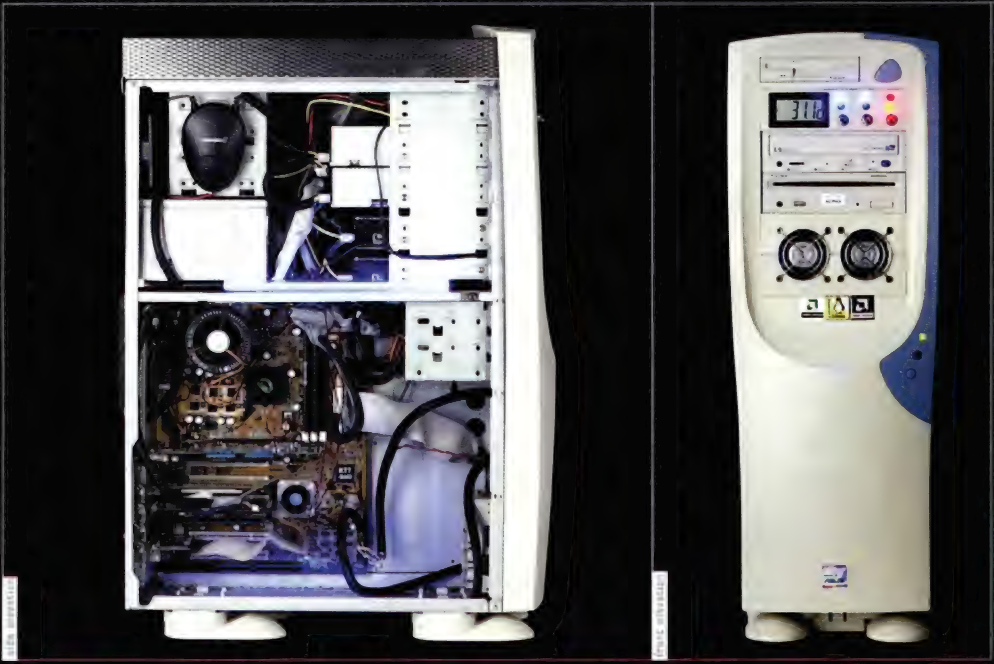
Lives: Penrith

In the box:
- PIII 866MHz @ 975MHz
- Gigabyte 6VX7+
- Leadtek GeForce2 GTS
- 128Mb PC150
- SBLive!

What's Special?
- Perforated steel case
- LCD Temp. display
- Front audio jack
- 4 internal high-power LED

Why: "While looking through the garage for wood, I found the steel and thought 'Imagine the airflow!' It fitted perfectly"

"I use it for everything, but mostly games, LANs and surfing the web."



Builder: Stewart Paternoster aka "VooDoo"

Age: 29

Lives: Brisbane

In the box:
- Athlon 1GHz @ 1.15GHz
- ABit KT7-RAID
- Hercules GeForce2 Ultra
- 4 x IBM 30Gb ATA-100, RAID 0
- 256Mb Corsair Cas2
- SBLive!

What's Special?
- 16 fans
- LCD Temp. display with heat monitoring alarms
- Dual windows and dual Neon
- Stainless steel sides

Why: "Cutting the windows was fun. I stuffed it up so a mate in the air force fixed it for me."

"Most engineering places had no idea what I wanted"

Proud of your hot box? Send a low-res pic of the front and side to hotbox@atomicmpc.com.au. We'll be in touch if we like what we see.

DirectX 8.0

Simon Peppercorn examines Microsoft's latest gateway into gaming

In November 2000 Microsoft released the latest version of its multimedia API for the Windows operating system. With this release Microsoft has again received broad industry support as DirectX further embeds itself as the standard Windows gaming platform.

As new applications, mostly games, are developed they will be written to take advantage of the new levels of functionality contained within DirectX 8.0. DirectX must be installed for these programs to function correctly.

Essentially DirectX is an advanced set of API's that provide developers with a standardised environment for Windows based PC's regardless of the specific hardware the system may use.

> "To our dismay, we actually found performance to be worse using this new driver combination when compared to the old..."

ⓘ DirectX 8.0 still has some burning performance issues.

Previous versions were built around five major components:

- DirectDraw which (in a nutshell) provided management for your video memory and supported some of the hardware acceleration features of video cards.
- Direct3D allowed Windows access to the advanced 3D functions of 3D video cards
- DirectPlay provided and interface which simplified online gaming
- DirectInput gave Windows better access to digital and analogue input devices such as joysticks and
- DirectSound for...you guessed it...direct access to your sound card.

DirectX 8.0 holds a number of significant enhancements. There is more improvements to DirectX than can be listed here, but this article will go through some of the more significant changes.

DirectGraphics

Direct3D and DirectDraw have been merged into a single component, now known as DirectX Graphics. This simplifies the development of applications and provides an overall improvement in performance. The API provides support for the latest graphics hardware features.

An important enhancement is allowing developers to use programmable shaders (a piece of code designed for use in either the programmable vertex pipeline or the programmable pixel pipeline). You may also hear this referred to as "pixel shaders" or "vertex shaders"

These shaders providea wide range of custom effects including matrix palette, procedural geometry operations, morphing and tweening animations and per-pixel lighting (bump mapping).

Other graphics enhancements include:

- 3-D volumetric textures, which provide the ability to create flexible texturing of volumetric atmospheric effects, range attenuation in per-pixel lighting as well as arbitrary geometry.
- The extension of the support of geometry blending, allowing a matrix index to refer to the matrices used for vertex blending
- Full-scene anti aliasing and multisampling effects, eg depth-of-field and motion blurs.

DirectPlay

DirectPlay provides network services for the Windows OS, which operate independently of the media. This means that even though DirectPlay currently runs over TCP/IP networks, IPX networks and also serial connections, the API can be easily extended in the future as new network standards and protocols become widely used. DirectPlay operates at the transport and session levels of the OSI model.

Some new features of DirectPlay include:

- Methods for creating both server-side and client-side portions within a client/server type application.
- The scalability of huge multiplayer projects by allowing for maximum parallelism using an asynchronous call-back model.
- The inclusion of the DirectPlay Voice API, providing developers with the ability to add

voice communications to their apps using a codec which is low in bandwidth and is also royalty free. This API is flexible enough to control who can hear whom within a gaming session, and because it integrates with DirectSound the application can provide individual effects, such as reverb, to each individual voices.

- The ability to easily configure NAT's (Network Address Translators) and Firewalls for online games. This is made possible as developers can now configure their apps to use a single and selectable UDP port for game data.

DirectInput

DirectInput is an interface for different advanced input devices such as force feedback joysticks, head gear and other peripherals.

The DirectInput API for DirectX 8.0 now supports action mapping. This enables an application to establish a connection between input devices and input actions while not depending on a particular device object being present (eg actual buttons or axes). This means that developers don't have to rely on custom device profilers, custom user interfaces or custom game drivers. (At last, no more calibrating your joysticks!)

Should I upgrade from DX 7.0a?

In the land of press release, DirectX 8.0 looks as if it is a must-have for all PC gamers. But does it actually increase game performance in the real world? We tested it on our 1GHz Athlon with GeForce2 GTS 32MB, with NVIDIA's new DirectX 8.0 optimised driver set, the leaked Detonator 7.17 drivers. To our dismay, we actually found performance to be worse using this new driver combination when compared to the old DX7.0a and Detonator 6.31 combination. Whilst the performance decreases were minimal, in the region of 2% in both our 3Dmark2000 Pro and Quake III Arena benchmarks, there have been many complaints from the gaming community that D3D games seem to stutter more when using DirectX 8.0. So, unless you are installing a game such as Mechwarrior 4 which requires DirectX 8.0 to run, we recommend you hold off from installing it. It shouldn't be long before a more refined version of DirectX 8.0 is released, as well as more optimised graphics drivers that should take advantage of its enhanced features to provide a performance increase.

ⓘ Can you find your mecca with DX8?

DirectInput has added keyboard properties, enhanced joystick slider properties and new DirectInput object features.

DirectShow

DirectShow is the framework for streaming media within Windows. It provides the ability to playback and capture both audio and video streams in a number of different formats, including .wav, .mp3 .avi and .mpg

Microsoft's DirectShow is now included in DirectX 8.0 and has also been updated.

> **"...the ability to add voice communications..."**

By integration with DirectX the API can automatically use the hardware acceleration features that may be present in the audio or video devices.

Additions to the DirectShow API include the ability to read and write Windows media format files through two new filters; the ASF Reader which reads and parses any Windows Media files and the ASF Writer which...you guessed it...writes Windows Media files, but also does any required multiplexing and compressing.

Another new feature of DirectShow is DirectShow Editing Services, which has been built on top of the DirectShow architecture. This API allows for video editing and sequenced playback. This provides developers with a tool to create complete video editing applications.

Other improvements to DirectShow include:

- Developments in DVD support including the addition AC-3 support for S/PDIF out, karaoke multichannel audio support as well as simplified access to DVD text information strings.
- Support for MPEG-2 transport streams via the new MPEG-2 Demultiplexer.
- Several new filters such as MJPEG Compressor and MJPEG Decompresser as well as an MPEG-2 Demultiplexer, a Null Renderer and a sample grabber

You can download DirectX 8.0 from [illegible]

The VIA Cyrix III

Computing in the cheap seats with Daniel Rutter

If you peruse the wares of budget-priced PC makers, you'll see a fair few computers powered by VIA Technologies' inventively named VIA Cyrix III CPU. The clock speeds seem OK, and the price is generally significantly lower than similarly specified machines based on Intel's Celeron or AMD's Duron chips. Cyrix III CPUs are also available retail that you can stick them on a motherboard yourself.

But should you?

On the plus side, the Cyrix III certainly is cheap. Little more than $100 for a 550MHz model. As I write this, the 650 and 667MHz IIIs have just been announced, and even these top-spec models have thousand-unit wholesale prices of a meagre $US55 and $US60 per chip.

The Cyrix III also consumes only about half as much power as a similarly clocked Celeron. That doesn't matter much for desktop machines, but it makes the Cyrix III a good prospect as a mobile processor.

The Cyrix III is also a Socket 370 CPU, like Intel's current Pentium IIIs and Celerons. It'll work on pretty much all recent Socket 370 motherboards; the motherboard BIOS just has to recognise the Cyrix III. Some Cyrix IIIs use a 100MHz Front Side Bus (FSB) and some use 133MHz, but all current motherboards can do 100 and most can do 133.

The big question, though, is how fast is

Cyrix history

AMD hired a load of people from Alpha and suddenly made a big impact with their Athlon, which sits on an Alpha-developed bus and has a number of other similarities with the major workstation CPU manufacturer's chips.

VIA, which had previously absorbed Cyrix, did a similar trick. They scrapped the Cyrix-designed "Joshua" chip that they'd intended to sell as the Cyrix III, and instead bought up Centaur, who were the creators of the low-end WinChip CPU that had made not much of a

the Cyrix III? The answer - not very, for many tasks. It is emphatically NOT a CPU for everyone.

Speed, or the lack thereof

AMD 3DNow! and Intel MMX extended instruction sets are supported, and it also includes a 128 kilobyte full-speed Level 1 (L1) cache. Which is really good, and really fast. Unfortunately, the CPU has no Level 2 (L2) cache at all.

L2 cache does a similar thing, conceptually, to L1 - it stores recently-dealt-with data in case it needs to be looked at again, and by various means the computer tries to make sure that data's put into the super-fast cache memory before the CPU needs it. This means the processor doesn't have to wait for the relatively slow main RAM to deliver the goods.

L2 cache is slower than L1, but there's more of it. Well, on processors that HAVE it, there is. Since the Cyrix III has no L2 (like Intel's earliest Celeron CPUs), its total cache amount isn't very impressive, despite the hefty amount of L1 it includes.

For business applications, VIA claims a Cyrix III performs only slightly better than an identically clocked "Mendocino" Celeron - the Pentium II based Celeron that was superseded by the Pentium III based "Coppermine 128" Celerons.

VIA Cyrix III Processor

But for productivity apps that load the CPU up more - Photoshop, Adobe Premier, structured drawing programs - the Cyrix III gets spanked embarrassingly by a Celeron.

This is partly due to the small cache, but mainly because the Samuel core's Floating Point Unit (FPU) is very slow indeed. Many graphics apps do at least some floating point work, and when they do, the Cyrix III crawls.

3D games need lots of floating point grunt. Which means the Cyrix III, not to put too fine a point on it, sucks for 3D games. It's about as good as a Mendocino Celeron running at HALF of the Cyrix III's clock speed.

When running scientific computations, pro 3D rendering or some other task that's practically all FPU work, the Cyrix III will lose to a Celeron at the same clock speed by a factor of approximately THREE.

Cranking it up

If you're an overclocker looking for integer performance on the cheap, you'll be pleased that the Cyrix III isn't multiplier-locked. Given the Cyrix III's crummy FP performance, even at 1000MHz it'll lose for FP-intensive tasks to any Celeron on the shelves today. And since the Celeron can be overclocked to 800MHz, it doesn't matter whether you intend to overclock or not.

> "It is emphatically NOT a CPU for everyone."

Is it worth it?

If you run demanding productivity apps, or 3D games, don't buy a Cyrix III. However, if you just want a business box at the lowest possible price, and you want a motherboard onto which you can drop a Celeron or Pentium III in the future, the VIA Cyrix III is much more interesting, simply because it's so blooming cheap.

VIA Technologies: www.via[illegible]

atomic

Results of overclocking via the FSB (Front Side Bus)

CPU	Max attainable speed	Vcore voltage needed
Cyrix 600	666MHz	2.05V
Cyrix 667	730MHz	2.05V

splash for IDT. Centaur's "Samuel" CPU design got the nod for the Cyrix III label.

Cyrix and IDT both have a bad reputation with anybody interested in high performance computing, because they specialise in low cost chips with OK integer performance - for boring office applications - but lousy floating point (FP) speed. FP performance matters for a lot of more advanced computing but it also has a big impact on how good a CPU is at 3D games. Lousy Floating Point Unit (FPU) equals lousy game frame rate.

VIA are still selling the Pentium-compatible Cyrix 6x86, which Cyrix produced in partnership with IBM, and its enhanced descendant, the MII. Cyrix made a name for themselves, and it wasn't a polite one, by using the "P-Rating" to specify their processors - numbers that indicate what Intel processor theirs is supposed to match, not what speed it's actually running at. AMD did the same thing for a while, but Cyrix stuck with it for longer.

As a result, many people bought "6x86-300" CPUs without knowing they were getting a 233MHz chip that performed roughly like a Pentium at 300MHz (if such a thing were to exist) for business apps, but generally worse than a 200MHz Pentium for floating point intensive tasks.

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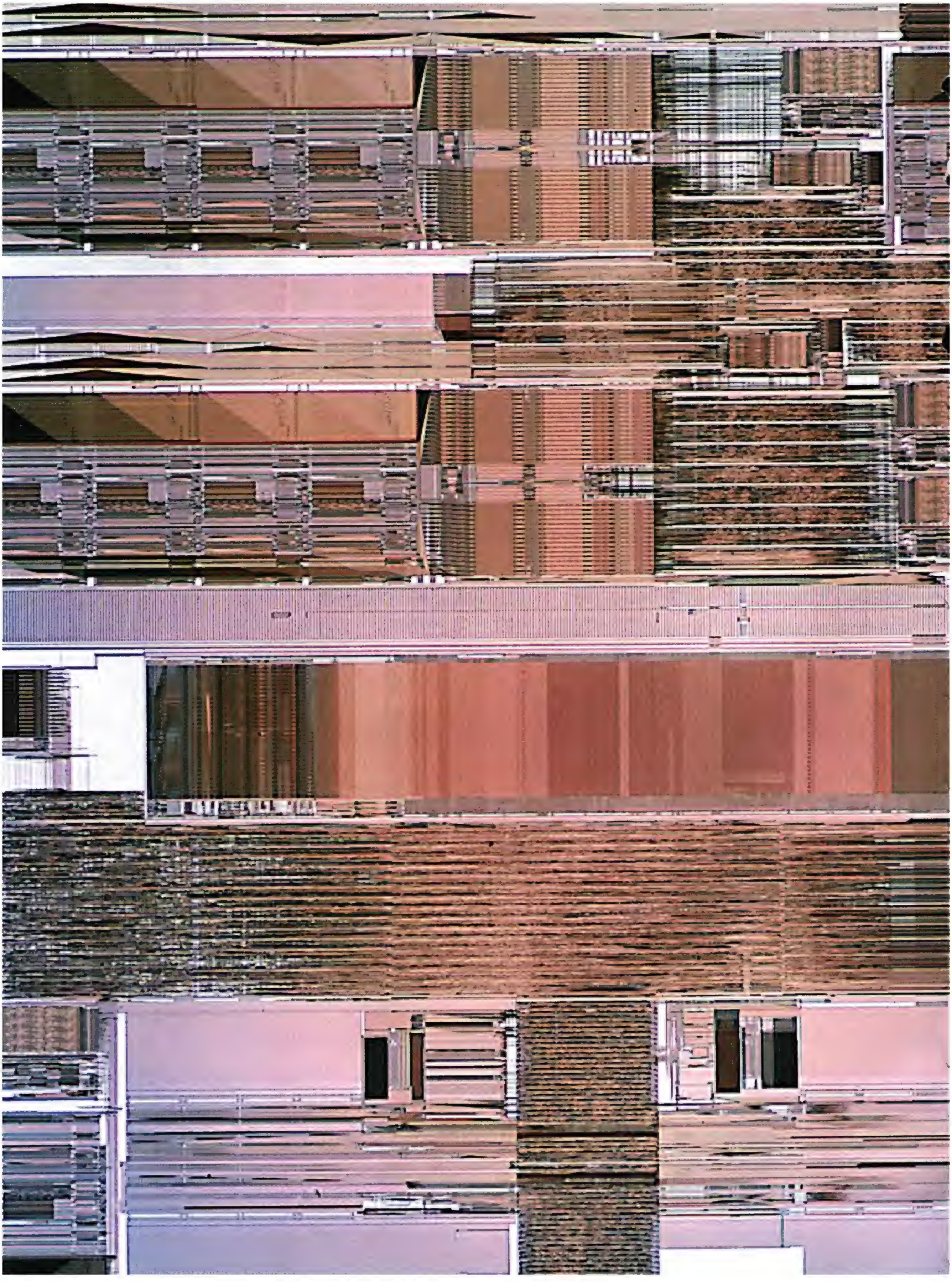
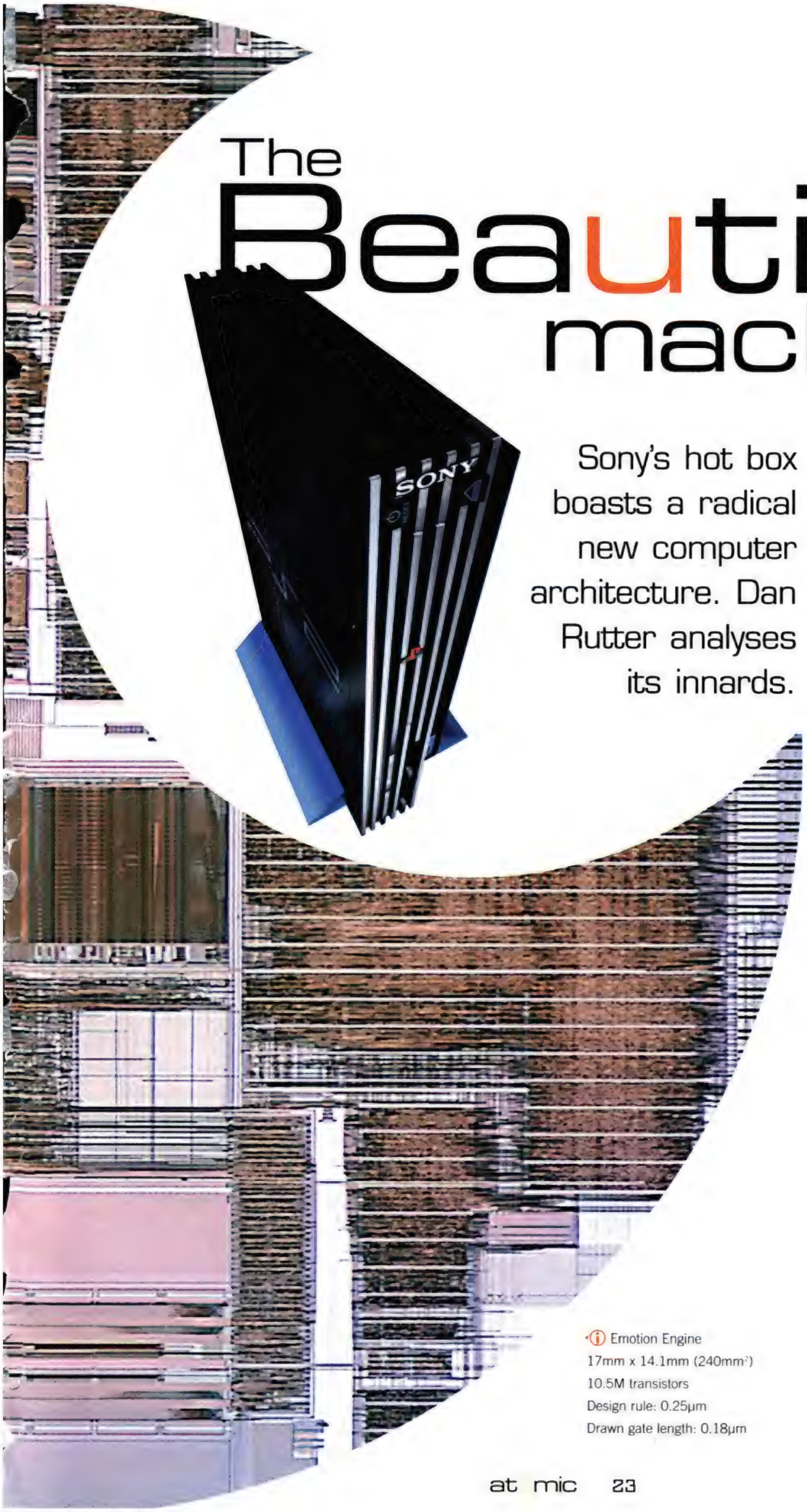


The Beautiful machine



Sony's hot box boasts a radical new computer architecture. Dan Rutter analyses its innards.

The PlayStation 2 is Sony Computer Entertainment's vision of the future of, well, computer entertainment. One black box, many funky features.

Function one: High powered games console. The PS2 is, indubitably, the most powerful games console ever made. We'll get into the juicy hardware details in a moment, but, in a nutshell, the PS2 beats the pants off the highest powered PCs in several game-relevant departments, and leaves other consoles well and truly behind.

Just having the heftiest hardware doesn't make you a winner in the video game world, though. The early games for the PS2 don't exactly put it head and shoulders above Sega's cheaper Dreamcast.

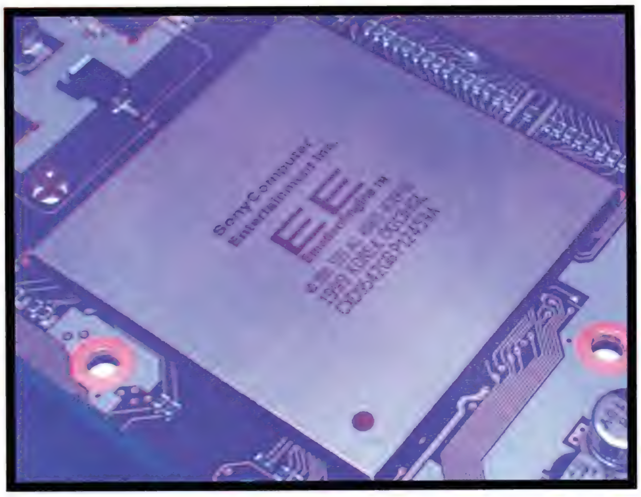
Fortunately, the PS2 isn't a one-trick pony.

Function two: DVD player. With optical digital output for sound and compatibility with standard Dolby Digital and DTS too, it stacks up well against stand-alone DVD players. Just doing state of the art games and DVD playback as well make the $749 PS2 a pretty good deal. But there's so much more.

Emotion Engine
17mm x 14.1mm (240mm²)
10.5M transistors
Design rule: 0.25μm
Drawn gate length: 0.18μm

We call them 'CPUs' - Sony prefers 'Emotion Engine'. It's a cultural thing.

Function three: Expandability. The PS2 has Universal Serial Bus (USB) and i.Link ports on the front, for which there will be keyboards and mouses and broadband Internet adapters. And ordinary modems, and scanners, and even hard drives, according to Sony. Put it all together and you get something that looks rather like a normal home computer.



Emotion Engine

The Emotion Engine ('EE') is the Toshiba-designed Central Processing Unit (CPU) for the PS2. It's the core of the console's unusual system architecture. The PS2 works in fundamentally different ways from the consoles that came before it, and from current personal computers as well.

By general purpose CPU standards, the 300MHz EE isn't a particularly powerful processor. But for the narrowly defined task of running 3D game software, it's a purpose-built speed machine, with several internal sub-units connected together with very fat pipes indeed.

> **"Even the latest PCs can't match the PS2's 3.2 gigabyte per second RAM bus bandwidth"**

Sony's Graphics Synthesiser will have to perform well against nVidia's upcoming X-Box chip.

The EE's made to do 3D graphics vector calculations at enormous speed. To help it, the PS2 is provided with super-fast inter-component busses, multiple ultra-fast caches, and the ability to manage up to 10 simultaneous data transfers to and from the EE.

What this boils down to is an internal architecture designed to keep huge amounts of data flowing. Even the latest PCs can't match the PS2's 3.2 gigabyte per second RAM bus bandwidth. In comparison, Intel's Pentium 4 with RDRAM pushes 1.5 gigabytes per second around the system.

The EE is based on a MIPS III core, which in various incarnations is the base for processors found in lots of other devices, from the original PlayStation and Nintendo N64 to Windows CE computers and PC peripherals.

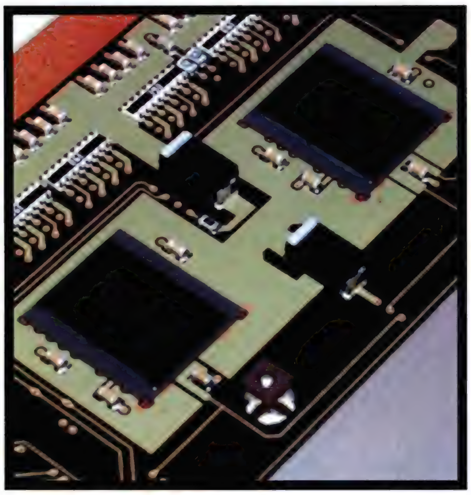
The MIPS core, though, is just the real 'CPU' of a multi-processor cluster packed into the EE package. There's also a pair of Vector Units, dedicated vector math processors somewhat akin to those found in supercomputer CPUs.

There's an Image Processing Unit, whose main function is MPEG-2 video decoding (useful for DVD playback and game cinematics), and a Graphics Interface Unit (GIF), whose job it is to marshal multiple display lists generated by the other EE sub-units and send to the Graphics Synthesizer the right instructions in the right order. And there's a separate floating-point co-processor.

And all of these units are tied together by separate 128-bit busses.

If your core function is games, you don't need big caches, if you've got lots of bandwidth. You want a constant flow of data through your system, and you're only going to be performing relatively simple operations on it - but you'll be doing lots of them.

General purpose computers may be doing very complicated things with relatively static data - spreadsheet recalculations, for instance. For that, they need big instruction and data caches, but not a lot of data throughput. It takes long enough to perform the complex operations on the data that there's no way to get much benefit from ultra-fast data input and output.



ⓘ RAMBUS lives! Sony's architechture clearly needs the speediest RAM in town.

This, plus the burden of backwards compatibility, is why PC inter-component bandwidth is increasing relatively slowly, while the size of the various blocks of cache memory in the computer - processor cache and graphics card memory, primarily - is growing by leaps and bounds.

Games consoles, though, can use all the bandwidth they can get. With lots of bandwidth, they don't need big caches.

Graphics Synthesizer

The Graphics Synthesizer ("GS") is the PS2's graphics chip. The Emotion Engine's primary reason for being is to generate rendering command sequences for the GS; the GS's purpose in life is to turn the command sequences, or "display lists", into graphics.

The GS has only four megabytes of integrated memory, which isn't anywhere near enough for even 640 x 480 3D graphics, if you've got PC-ish bandwidth problems. The PS2, however, can shunt data back and forth between the GS's memory and main RAM so quickly that the GS might as well, by PC standards, have the whole of the main memory built in to it.

Memory cards

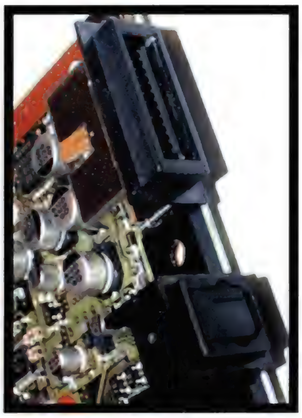
The eight megabyte PS2 memory card looks and feels unexciting because it's got the same form factor as the PlayStation memory cards. You can plug your old memory cards into a PS2.

But the new cards have much more capacity - PlayStation memory cards have only 128 kilobyte capacity - and are much faster.

Since this is a Japanese-type PS2, it's got DVD playback software on this one memory card that comes with the console. Non-Japanese PS2s, without the PCMCIA slot and with the hard drive bay in its place, have the DVD playback software built in, and nothing special on the pack-in memory card.

The same thing goes for the Emotion Engine. Its Vector Units have laughably small caches, by PC standards, but it's so fast to move data to and from main memory that it just doesn't matter. Because of the multi-channel Direct Memory Access (DMA) that the PS2 can do, it's possible for the multiple EE and GS units to do this sort of thing on the fly all the time with very little performance impact.

This is a problem for PC programmers getting into PS2 development, because they're used to dealing with an oceans-connected-by-creeks architecture (as it were), not with a puddles-connected-by-giant-raging-torrents one.



ⓘ The general purpose output is at the top and the Optical Digital sound output is below.

Memory

The PS2 has 32 megabytes of main memory - 16 megabytes in each of the two Rambus Dynamic Random Access Memory (RDRAM) chips that sit next to the Emotion Engine and Graphics Synthesizer.

On a PC, RDRAM doesn't do much for performance, because it's the strongest link in an otherwise weak chain. Yes, a PC with Rambus (or the new Dual Data Rate) memory has lots more memory bandwidth than one running, say, plain PC-100 SDRAM, but the system's full of other bottlenecks that mean the extra RAM speed doesn't translate to much of a performance increase for desktop computer tasks, including games.

The PS2 was designed for super-fast memory from day one, and each of the 16 megabyte RDRAM chips has its own fast 16-bit data bus.

ⓘ Need more USB ports? Connect an ordinary PC USB hub.

Front ports

The two USB ports, at left, have a maximum bandwidth of 12 megabits per second - less than 1.5 megabytes per second. They're thus suitable for anything up to high speed Internet access, including 10BaseT network adapters, scanners, and lower

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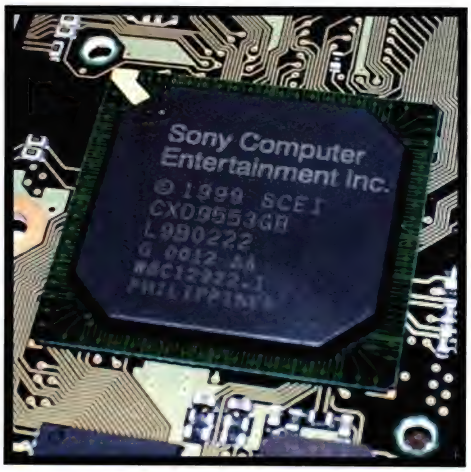
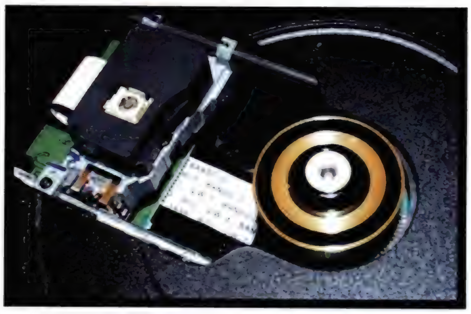


You're looking at a PlayStation. Well, more accurately, it's a PlayStation on a chip.



This is the CD-DVD drive. You put your CDs here. Then play games. Or movies.

bandwidth devices like phone-line modems, mouses and keyboards.

The i.Link port is almost an IEEE-1394 connector. IEEE-1394 is what Apple (who invented it) calls FireWire. Sony's version of it is the same, but has no power supply capability - i.Link devices must all have an external power supply, and can't run from just the i.Link cable.

i.Link and regular 1394 are compatible, but i.Link devices can't be powered from a 1394 cable, and 1394 devices connected to an i.Link socket must have a separate power supply.

i.Link has, like every other IEEE-1394 connector, a maximum bandwidth of 400 megabits per second, which is about 48.8 megabytes per second. It can't really move user data that quickly, but it can get pretty close, and it's more than adequate for one or more hard drives.

The PS2 also supports a Link Cable that lets you connect two PS2s together for dual-screen multiplayer games.

Backwards compatibility

Most of the functions of the original PlayStation have been condensed onto one chip in the PS2, which is how it manages compatibility with older games. Feed it a PlayStation game and the two big shiny chips next to this one on the PS2 motherboard go to sleep. The PS2 doesn't make PlayStation games look any better, or run them any faster; its new hardware does nothing when the old hardware's being used.

The PSX compatibility, mind you, isn't perfect. Games that deviated from the official Sony PSX Application Programming Interfaces (APIs) may be glitchy, or not work at all.

The programmers of such games were relying on the fact that they were writing for a fixed platform, and they knew exactly what it was. That's the beauty of consoles - they're all the same. "Hitting the hardware" in ingenious ways lets a coder grab some more speed and make the game more spectacular, and if all of the hardware's the same, it doesn't hurt compatibility.

Unfortunately, the PlayStation-on-a-chip isn't exactly the same as the PlayStation - it's only exactly the same if you code to the APIs. So ALMOST all games work properly.

The drive

The PS2's DVD-ROM drive can read DVD discs at 4X peak speed - that's four times stock DVD movie speed, or 5540 kilobytes per second - and CD-ROM discs at 24X peak speed, which is 3600 kilobytes per second.

As with virtually all other high-speed CD-ROM and DVD-ROM drives, the PS2 is a Constant Angular Velocity unit - it spins at the same speed no matter what track is being read. So you only get peak speed on the outer tracks of the disc.

Since discs are written from the inside out, this means it's impossible to get peak speed unless a disc is full, and you're reading the end-of-disc data.

Controllers

The PS2's Dual Shock 2 controllers aren't exactly a design revelation - they're exactly the same shape as the plain PlayStation Dual Shock. Old PlayStation controllers work on the PS2, too.

Even when you look inside, it's hard to spot the difference in the new controller. As before, there are two little vibrater motors which use an offset weight on the motor shaft to give you a realistic buzz when your racing car's tyres are bouncing over the ripple strip, and a... less realistic... buzz when practically any other dramatic event occurs. Those without a passion for hand massage can, of course, disable the Shock feature in their games.

Every button on the controller except for Start, Select and Analogue can work in plain digital pressed-or-not-pressed mode, or it can report to the PS2 how hard you're pressing it. Which allows you to have smooth analogue control of any appropriate input channel - running speed, pedal pressure, punch power - without having to set up the game so that that channel's controlled by a joystick.

The pressure sensors have an eight-bit encoder, for 256 different pressure levels.

>

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Cooling

With the lid off, the big fat chipset heat sink sticks up past the power supply, jutting into the breeze created by the small rear-mounted exhaust fan. Unlike PCs, the PS2 has just the one fan, and just the one heatsink for all of its hot chips - Emotion Engine, Graphics Synthesizer and RAM.

Remove the heatsink plate and attached RF shield, and you can see just how big the main cooling fin assembly is. Peel back the rubber thermal interface pad under the heat sink and you can see a heat pipe, there to facilitate heat transfer from the hot chips to the base of the fin assembly.

A heat pipe is an ingenious application of physics, that moves thermal energy very efficiently. It's a sealed tube with wicking material around the inside, and it contains a liquid that boils from the heat at one end. The vapour fills the tube and condenses at the cooler end of the pipe - moving the heat better than any solid metal could - and the condensed liquid then wicks back to the drier, hotter end of the pipe.

“Most of the functions of the original PlayStation have been condensed onto one chip in the PS2”

End game

The PS2's revolutionary hardware is its blessing, and its curse. It's so completely different from any other home computing device, from a programmer's point of view, that the learning curve for developers has been described as "vertical". It doesn't have warm and friendly APIs between the developer and the chips; you've got to know what's going on at the hardware level to write good PS2 games. Compare this to the Dreamcast's familiar C++ environment.

What this means is that it may take longer than usual for a good supply of games that really work the PS2 hardware to arrive. Every console has better and better games as time goes by and developers learn how to get the best out of it, but that effect may be more noticeable for the PS2. Some early titles for the new console, like Ridge Racer V, may be fun enough games but they really don't do the system justice at all.

For those of us outside the big Japanese, American and European markets, the hardware expansion side of things might take some time to get exciting too. Sony has made much of the ability of the PS2 to take a hard drive and be hooked up to a broadband network adapter, allowing you to buy whole games online and download them. But don't hold your breath for that to happen here at the same time as it happens in Japan.

Sony will be rolling out Internet connectivity options in the big markets as soon as it can, but a whole country with the population of New York City doesn't rate highly on the corporate priority list. We generally get extra services like that later, if we get them at all.

All of this means that Australians queuing at midnight for a PS2 are even nuttier than Americans doing it. If the currently available games totally turn your crank, then sure, do what you've got to do to get one.

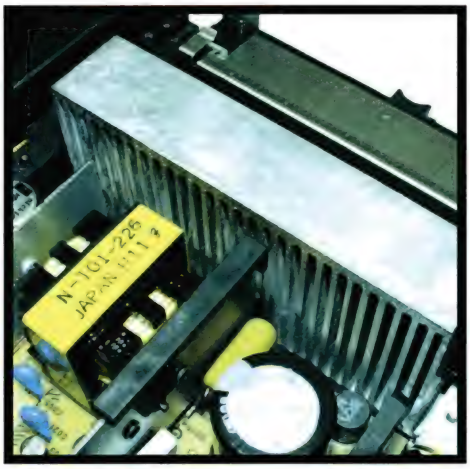
Otherwise, hang about until more hardware and better games are out, and the price has dropped. If you've got to have a whiz-bang console in the meantime, the Dreamcast beckons.

None of this, though, detracts from the fact that in almost all departments, the PS2 is a stunning technical achievement, and will certainly set the standard for console capabilities for some time.

This little thing is more like a supercomputer than any other consumer computing device. It's a small black lump of the future that sells for $749.

And if you're reading this magazine, that probably means you want one...

Now.



A single heatsink cools the EE, GS and RAM. With just one fan, PS2 runs quietly.

The heat pipe provides liquid cooling. This is serious machinery!

DVD

A revolution in data storage is underway. Simon Peppercorn examines the magic behind the media

By changing the read focus, a laser can read data from two different tracks on the same media.

Even though a DVD disc is the same physical size as a CD-ROM, which can store around 650Mb of data, a DVD disc can store as much as 17Gb of data with similar access times as well as faster transfer rates.

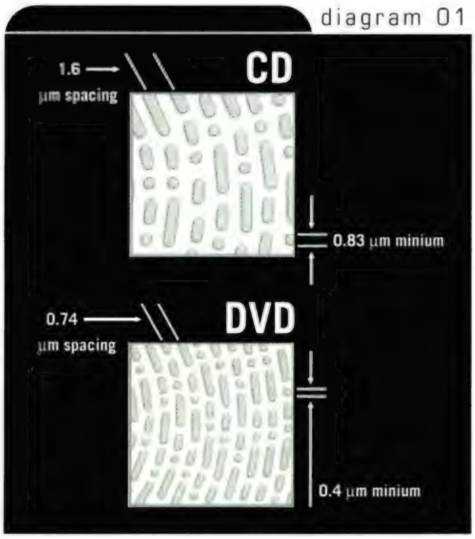
Both media store data in pits which spiral around the surface of the disc in a track (like an old vinyl record). This spiral is much tighter on a DVD than on a CD-ROM, which means you get a much longer track. Also the sizes of the pits are greatly reduced allowing for four times as many pits as CD's.

That bit was easy. The real technology behind DVD is the laser. Basically speaking, a smaller pit needs a smaller laser beam. DVD actually reduces the laser's wavelength from 780nm (nanometers), which is the infrared light of a standard CD, to 635nm or 650nm red light so the laser produces a smaller spot.

Layer upon layer

The other notable feature of a DVD disc is that information can be stored on more than one layer, simply by changing the focus of the read laser. The layers are created with an opaque reflective layer at the base and a translucent layer on top.

diagram 01



This diagram shows the differences between the pits and tracks of CD-ROM and DVD. Smaller pits, a much longer track and advancements in compression techniques allow for significantly more data to be stored on a DVD.

This method allows 8.5Gb of data to be stored on a single side of a DVD disc. If you do this on both sides you can achieve up to 17Gb of storage.

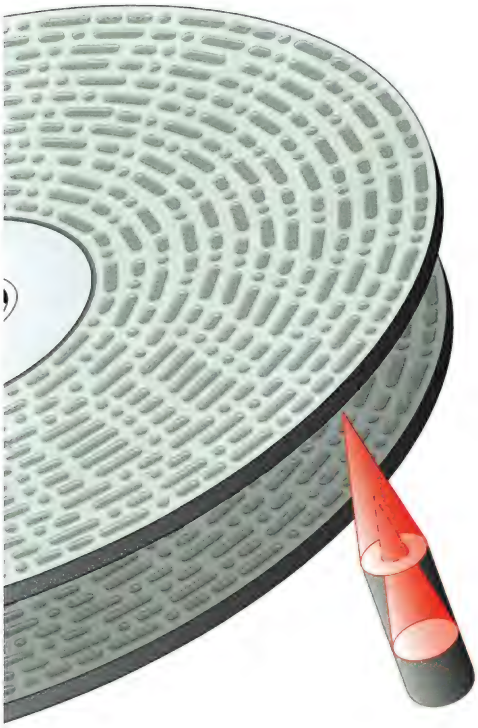
Dual layer discs are identifiable a number of ways:

- they're gold in colour
- the movie itself may be presented in both standard or wide-screen format
- there may be two serial numbers on one side

On a single layer DVD the information is stored from the inside hub of the disc on one track which spirals outwards. A dual layer disc can either use a track that runs in parallel or they can store data in a second, reverse spiral track. This is known as an OTP (Opposite Track Path) or RSDL (Reverse Spiral Dual Layer).

Just as there are different CD-ROM formats, there are a number of DVD formats as well.

- DVD-ROM is used as a high capacity data storage medium
- DVD-Audio is similar to CD-Audio and stores audio-only data
- DVD-Video is used for feature-length motion pictures which may include special features.
- DVD-R is the equivalent of CD-R for write once, read many storage
- DVD-RAM is a re-writeable DVD format



Speed Freaks

A 1X speed DVD drive will transfer data at 1.321Mb per second and can achieve bursts up to 12Mb per second or higher. This is roughly equivalent to a 9 or 10 X CD-ROM drive. Most 1X DVD-ROM drives have a seek time of 85-200 ms and an access time of 90-250 ms.

Universal Disk Format

The Optical Storage Technology Association (OSTA) developed a Universal Disk Format (UDF). This was designed to create a standard for the storage of data on optical media, which is independent of the hardware, software and operating system.

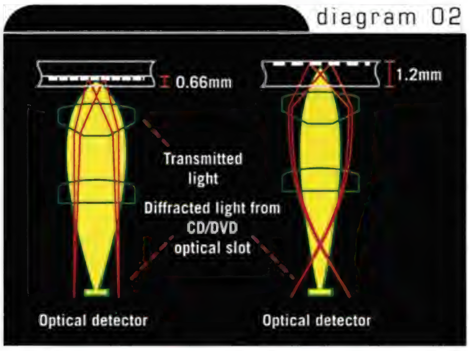
What this means, for example, is you can copy data to an optical storage media from Windows, then take that media and update the data on a Mac system, then use it under Linux and so on.

It is meant to be a replacement for the ISO9660 file system (also known as CDFS) used on CDROMs and will hopefully resolve most of the incompatibilities that currently exist.

This standard was endorsed by the world's leading optical manufacturers.

CD-R and CD-RW recorders can use UDF. By using a product such as Adaptec's Direct CD, a far more efficient use of disk space can be achieved. This happens through a process known as "packet writing".

diagram 02



By altering the path of the laser through the lenses, a finer laser point is created.

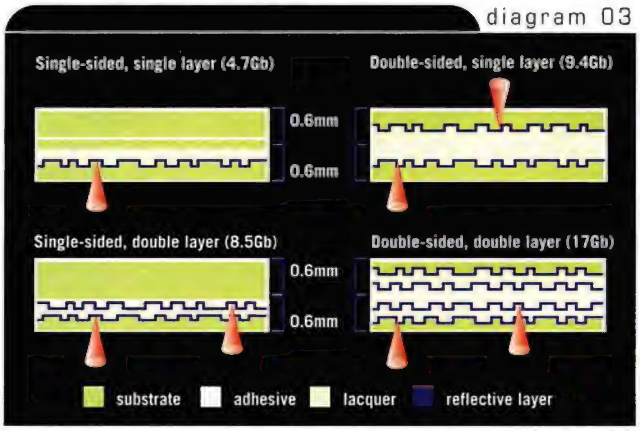
The UDF file system is not supported under any release of Windows 95. However, this doesn't mean that you can't read UDF media from within Windows 95. DVD providers created an interim format. This was called UDF Bridge, which is supported under Windows 95 OSR2. The original release of Windows 95 would only be compatible if the vendors of the DVD products themselves provided the support with their hardware.

MPEG Compression

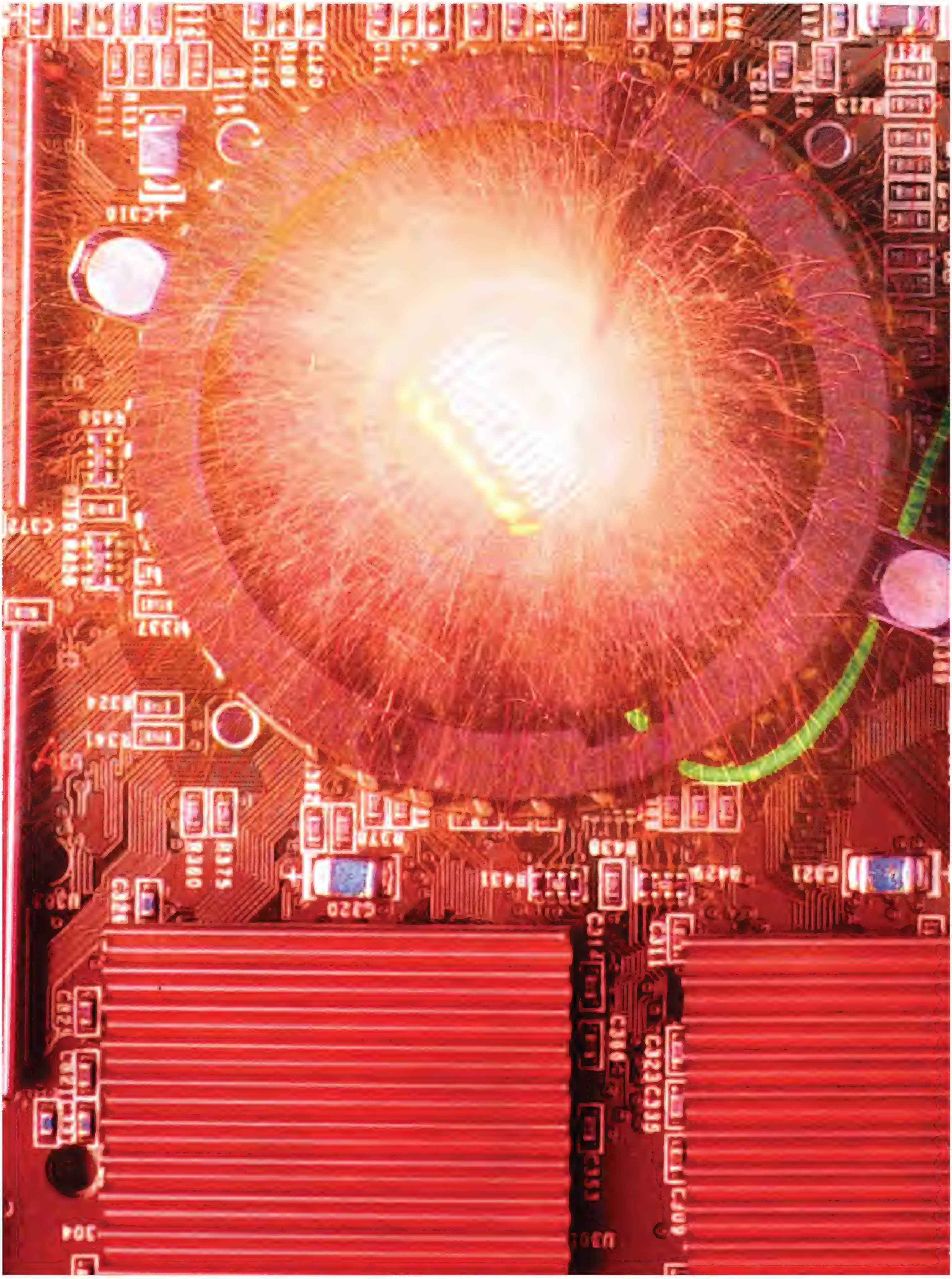
In 1993 a low bandwidth standard known as MPEG-1 was established. The screen sizes were small, often the size of a postage stamp, yet it proved satisfactory for home and business use and helped lay the ground work for the development of MPEG-2 in 1995.

Where MPEG-1 achieved data rates of 1 to 1.5Mbits per second, MPEG-2 allowed rates of up to 100Mbits per second. It was this massive jump in bandwidth, which made the MPEG-2 standard suitable for use on DVD-Video. The DVD-Videos you can purchase or hire from most video stores use this form of compression. This is usually at a resolution of 720 pixels wide by 480 pixels deep, compared to a pixel depth of between 250 and 270 used by VHS. ▢

diagram 03


Single-sided, single layer (4.7Gb)
Double-sided, single layer (9.4Gb)
0.6mm
0.6mm
Single-sided, double layer (8.5Gb)
Double-sided, double layer (17Gb)
0.6mm
0.6mm
substrate
adhesive
lacquer
reflective layer

These cross-sections of various capacity DVDs show how tracks are laid over each other to achieve high storage capacities.



reviews

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atomic reviews the latest in graphics cards to hit the street

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Microsoft Strategic Commander
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Here at atomic magazine, it is our primary intention to give you the final word on the latest in hardware and PC technology. An integral part of determining the performance of any particular piece of hardware is benchmarking - and this is something that we take very seriously in the atomic labs. As such, we feel that it is vitally important to fully understand all the benchmark tests that we use, and why we use them.

Whilst we strive to tailor our benchmarks to squeeze the most information out of a particular piece of hardware, we have a suite of regularly used benchmarks and a standard testbench setup which is specially chosen to provide comparative results for all our hardware reviews.

This first special article is intended to outline the details of all these testing procedures that we use in the atomic Labs, and to give you some insight into the lengths that we go to produce all the information you need to make your pivotal purchasing decisions.

≫

benchmarking software

3DMark2000 Pro - www.madonion.com
Quake III: Arena - www.quake3arena.com
SiSoft Sandra Professional 2000 www.sisoftware.co.uk
MDK2 - www.bioware.com
Evolva - www.evolva.com
Video2000 - www.madonion.com

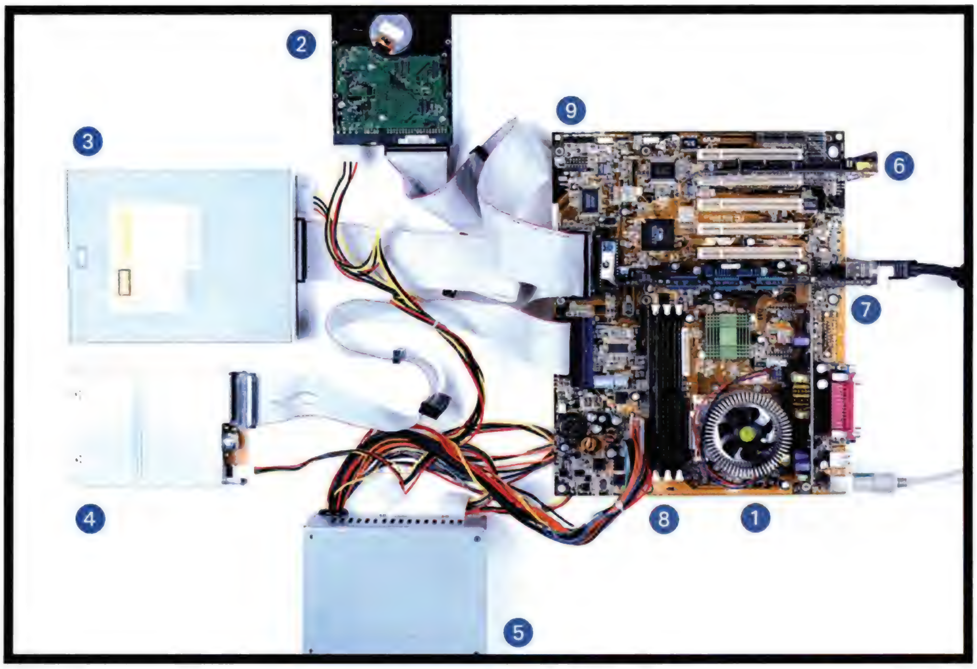
atomic benchmarks

The ins and outs of the rigorous atomic labs testing procedures

In the traditional sense, a benchmark is a physical object or mark, as used in surveying land, that is placed at a known elevation and location and is then used as a point of reference to determine the elevation of other nearby locations. In computing terminology, a benchmark has a similar symbolic meaning - it serves as a point of reference against which the performance of a particular piece of hardware is tested. The benchmark might be a real-world value, such as the time it might take to perform some operation like a gaussian blur in Adobe Photoshop, or it might be an abstract figure, like the MIPS (Millions of Operations Per Second) of a CPU.

There are many ways to test a particular piece of hardware, whether it be a CPU, graphics card, monitor or even a whole PC - although some methods are better than others when it comes to actually determining how that hardware will perform in real-world terms for you at home. As such, it is imperative that we choose the right type of benchmark for the particular hardware being tested in order to get results that are both accurate and relevant.

There are four broad types of benchmarks: there are system-wide and component tests, and then there are synthetic and application-based tests, and combinations of these. Component tests focus on a specific component in your PC, such as the CPU or graphics card, and stress that single feature without interference from the rest of your system. These tests are good at determining the performance of an isolated area of your PC, such as 3D or FPU (Floating Point



ⓘ The atomic testbench laid bare.

1. AMD 1GHz Athlon CPU
2. 7,200rpm UDMA-66 20Gb HDD
3. ASUS 12x DVD-ROM
4. Generic 3.5" Floppy Drive
5. 300 Watt PSU
6. SoundBlaster Live! Player
7. Hercules Prophet II GTS 32MB
8. Transcend 128MB PC-133 CL2 RAM
9. ASUS A7V motherboard

Unit) speed, but they suffer from being fairly unrealistic since they isolate that component from the rest of the system. System-wide tests, on the other hand, take the PC as a gestalt whole and factor in the performance of all the individual components, and how they interact with each other. These tests generally give a reliable indication of how the system will perform in real-world operations. The drawback, however, is that they cannot be used to easily distinguish the performance of particular components in the system.

Synthetic benchmarks are created specifically to test the performance of particular components, and are generally engineered to isolate the main performance bottlenecks and push them to their limits. Synthetic tests are especially good at focusing on very particular functions, such as 3D, and are not limited by the bounds of conventional programs. Application-based benchmarks use an actual application and are intended to show the performance of the PC when running the kinds of programs that people actually use. This has the advantage that, if done properly, an individual can immediately gauge the performance of the hardware in tangible and concrete terms. On the down side, application-based benchmarks are limited to testing those things that are stressed by current applications, and there are occasionally things that we need to test that are simply not available in current applications, such as was the case with the hardware transform and lighting engine in the NVIDIA GeForce256 chipset several months ago.

atomic Testbench specs

There are two testbenches in the Labs, one for running AMD processors and one for Intel processors. Both are running Windows ME, DirectX7.0a, Liveware 3.0 for Windows ME and Detonator 6.31 reference drivers.

- **AMD Athlon Thunderbird 1GHz system – ASUS A7V motherboard**
- **Intel PentiumIII/1GHz system – ASUS CUSL2 motherboard** (Both supplied by CASSA, (07) 5445 2992, nathan@cassa.com.au)

Common Components

- **Transcend 128Mb PC133 CL2 SDRAM** (Supplied by CASSA)
- **Hercules Prophet II GTS 32Mb** (Supplied by Guillemot, www.hercules.com)
- **SoundBlaster Live! Player** (Supplied by Creative Labs Australia, www.creaf.com)
- **ASUS 12x DVD-ROM** (Supplied by CASSA)
- **7,200rpm UDMA66 20Gb hard disk**
- **Floppy drive**
- **300Watt PSU**

One of the 3DMark2000 Pro tests which utilise the Max Payne engine to stress video hardware to the limit.

The Testbench

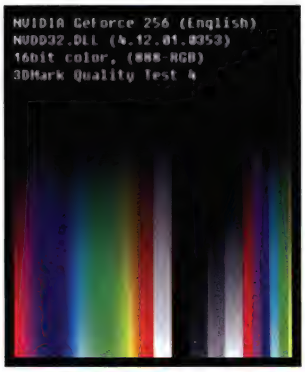
Whenever a piece of kit arrives, the first thing we do is determine the most appropriate platform and benchmarks that should be used to test it out. As a part of the hard-edged atomic testing philosophy, we prefer to insure that our benchmarks are stressing the hardware to its limits so that we can be absolutely sure what its maximum potential really is. To do this we need to have a top-specification testbench that can be guaranteed to make the component on test the bottleneck in the benchmarks.

Stability is a primary concern, however, so the standard atomic testbench is not overclocked in terms of CPU frequency or RAM latency.

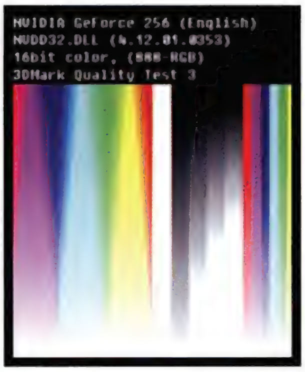
SiSoft Sandra 2000 Professional

Sandra, from SiSoftware, is a comprehensive benchmark and diagnostics utility. It contains dozens of special applets that retrieve detailed information about the specification and settings of a system by polling each component's firmware or BIOS. Sandra also features a small suite of synthetic benchmarks for specific components.

The most interesting of these tests are the CPU tests: Dhrystone, Whetstone, and CPU Multi-Media Benchmark and memory test. Dhrystone tests the integer processing power of the CPU and gives a result in MIPS (Millions of Instructions Per Second). Whetstone is similar to Dhrystone except that it tests the CPU's floating point performance, and produces a result in FLOPS (Floating Point Operations Per Second). Both of these tests are highly synthetic, but are useful in demonstrating the differences between two processors in raw terms. The CPU Multi-Media Benchmark tests the processor's implementation ≥



NVIDIA GeForce 256 (English)
NVDD32.DLL (4.12.01.0353)
16bit color, ([illegible]-RGB)
3DMark Quality Test 4



NVIDIA GeForce 256 (English)
NVDD32.DLL (4.12.01.0353)
16bit color, ([illegible]-RGB)
3DMark Quality Test 3

ⓘ The video quality tests in 3DMark2000 Pro cover a wide range of features. These tests show multiplicative alpha blending and additive alpha blending.

of enhanced instruction sets like MMX, 3DNow! and SSE, by running through a complex Mandelbrot fractal algorithm, and counts how many iterations can be calculated per second. The Sandra Memory test measures a system's sustained memory bandwidth by running a simple calculation that utilises a great deal of the system's physical (i.e.: not virtual) memory, and gives a result in terms of Mb per second. The result is usually not as high as the RAM's maximum theoretical bandwidth since the test both reads and writes data in the way an application does.

3DMark2000 Pro

3DMark2000 Pro is a powerful benchmark for testing Direct3D performance, and is the successor to the popular 3DMark99 MAX. Although it is a synthetic benchmark, it uses the advanced Max Payne 3D engine, which is representative of the latest in Direct3D technology. It tests both individual features of the 3D card, like fill rate, bump mapping, texture filtering and polygon throughput, and all the features used in unison through a simulated game environment. The standard resolution for testing is 1,024 x 768 with 16-bit colours and a 16-bit z-buffer. The current version of 3DMark is designed specifically for DirectX 7, although with the release of DirectX 8, we'll be updating the benchmark as soon as MadOnion releases it.

Quake III Arena

Quake III Arena, from id Software, is the extremely popular first-person shooter that represents the latest in OpenGL gaming technology. Quake III: Arena has a built in benchmarking utility and some built in demos that can be used to test graphics card performance. We also use the popular Quaver demo to stress the system further than the normal demos, but an even more intensive atomic demo is currently under production, pending the release of the final Q3A patch.

For CPU testing, we run the demos at low resolution, eliminating the video card as a bottleneck in performance. Video card testing requires the same demos to be run at higher resolution, texture and colour settings, thus putting the video card under more strain.

Other benchmarks

While the above tests form the core of the atomic benchmark suite, there are dozens of other applications and benchmarks that we use. These benchmarks will change month to month as we strive to use the best possible tests for that particular component. In each review that you read in atomic, we will be sure to clearly outline all the details of the tests that we have performed.

We also value your feedback. If there are any tests that you think we should be running, or you have questions about our test methodology, please contact us through the atomic email address, labs@atomicmpc.com.au. ▢

ⓘ Quake III: Arena is in widespread use as an application-based benchmark for both video and system testing.

BIOS settings for testing

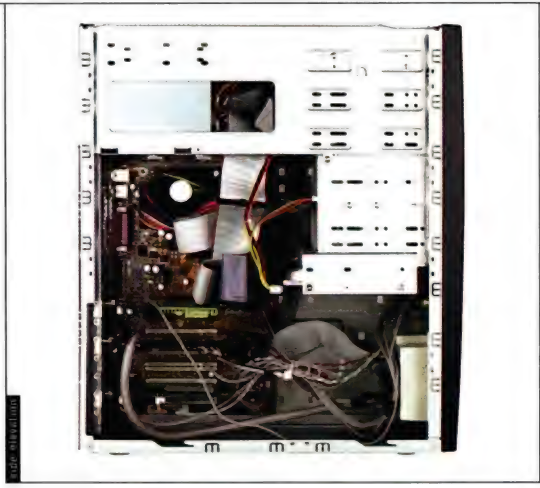
These are only a guide. Different BIOS types will have different names for these values. A general rule of thumb is if in doubt, don't touch it. A lot of BIOS settings are aimed above the scope of mere mortals. However you can look forward to our upcoming feature on BIOS tweaking.

- System memory - By SPD (133MHz CL2)
- System bus speed - default
- System speed - optimal
- AGP - 4X with Fast Writes enabled
- Spread spectrum - off
- Plug and Play OS - no
- Video Bios Shadow - off
- DMA - enabled

ADVERTISING

Creative BlasterPC Premium

It's black and it contains a whole swag of Creative's best equipment.



specifications

- Intel PIII 800MHz
- Creative Apollo Pro133A Motherboard
- 128MB SDRAM
- 30GB 7,200rpm HD
- Creative Encore 12X DVD-ROM
- Creative 17" Monitor
- Creative SoundBlaster Live! Platinum
- Creative 3D Blaster GeForce2 Ultra 64MB
- Cambridge Soundworks PS2000 speakers
- WinME
- Creative BlasterPC Multimedia Keyboard and wheel mouse

Now that PC manufacturers have started releasing coloured cases, monitors and keyboards, PC users no longer have to put up with boring beige colour schemes. No, now we have a choice of black, black or black. Creative's new BlasterPC Premium is the latest of these black boxes.

Creative has a well deserved reputation for audio excellence, so it was no surprise to see the top of the line Soundblaster Live! Platinum sound card within the system. Combined with the Encore 12X DVD-ROM drive, the Premium at first looks to be quite suitable for all your home entertainment needs, however the supplied PS2000 speakers don't match this beefy back end.

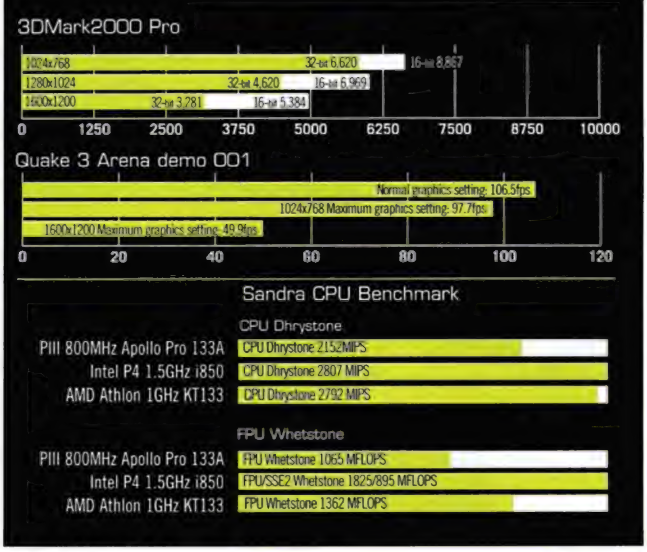
The Premium ships with a PIII-800MHz CPU running on an Apollo Pro133A motherboard, which whilst not exactly cutting edge should still provide more than enough power for all but the most demanding games.

Surprisingly, hooked up to this system is Creative's mega-video card, the Creative 3D Blaster GeForce2 Ultra. This blazingly fast video card seems to be somewhat out of place, but nonetheless helps lift the speed of this otherwise mid range system.

Unfortunately the 17" monitor supplied with the Premium is only capable of displaying up to resolutions of 1280 x 1024, and it is only at this resolution and above that the merits of a GeForce2 Ultra over a GeForce2 GTS become apparent.

Despite its few flaws, the BlasterPC Premium still comes across as a tidy system. If you're looking for the biggest and best, the BlasterPC Premium isn't the one. But then again it is also nowhere near the most expensive.

technical details



atomic
7/10

The CLAW

Taking on the almighty keyboard with style

specifications

- Left handed FPS keyboard replacement
- Hardware programmable - no drivers needed
- PS2 or AT Keyboard only

front elevation

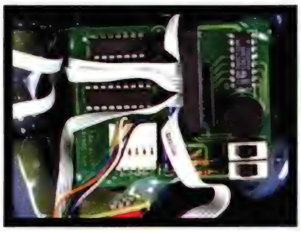
top elevation

Since the dawn of the first person shooter, many attempts have been made to improve on the trusty keyboard and mouse control combo.

Designed by Australian company Ferraro Designs (www.claw.com.au), The CLAW is the latest controller to enter the fray. Sitting under the left hand it provides fingertip button positioning for comfortable and easy use, leaving the right free to use the mouse.

The controller itself is a thing of beauty; with its sleek, ergonomic lines it sits on the desk begging to be used. Unusually, it runs via a keyboard pass-through cable and requires no drivers for use. Internally there are two configurable EEPROM memory banks for mapping the nine buttons on the controller to multiple (up to five) or single key presses.

In order to connect The CLAW, the keyboard pass-through must first be installed. On ATX motherboards the plug for The CLAW blocks one of the USB ports, which is problematic to say the least. Also, because of the hardware button setup The CLAW will not work with USB keyboards.



ⓘ Using cheap and simple flash EEPROMs, The CLAW requires no software drivers.

The CLAW has been designed with the first person shooter market in mind. By replicating the keyboards functionality (and leaving the right hand free for mousing) automatic compatibility with any PC game is guaranteed. It would even make the sexiest keypad known to man for those non game data entry tasks.

The big issue is choosing exactly which controls you wish to bind, with 9 buttons to choose from more advanced configs can become awkward.

Of course the crunch comes in how The CLAW performs in-game. As with any new controller it is hard to get used to. An extra button under the index finger would be a bonus for backwards movement in first person shooters. In game the control is smooth, and it is a lot more comfortable than the cramped hand on keyboard position.

However, I kept finding my hand drifting back to the keyboard. The nine button limit does prove a barrier to intuitive gameplay, especially for a compulsive in-game talker like myself - constantly bashing out text messages whilst trying to run around (see page 52 for a better way to chat in-game).

> **"...more comfortable than the cramped hand on keyboard..."**

Like any variant to the standard keyboard and mouse combo, The CLAW is very much a personal choice. Over extended periods of gaming there is no doubt that The CLAW's design leads to a much more relaxed gaming experience, and it is an effective controller to use. The limited number of buttons and poorly designed keyboard plug combine to detract from the overall experience and one does wonder whether the keyboard actually needs replacing. ○

atomic
7/10

Dell Dimension 8100

It's black and shiny and hell-fast. It's also our first Pentium 4...

specifications

- Intel P4 1.5GHz CPU
- i850 motherboard with 400MHz FSB
- 2 X 64MB PC800 RD-RAM
- Dell GeForce 2 Ultra with 64MB DDR-RAM
- 40GB ATA-100 Hard Drive
- Turtle Beach Santa Cruz DSP Sound Card
- Altec Lansing ADA 885 4 Speaker with subwoofer surround sound speakers (fully THX compatible)
- Dell 19" Trinitron tube flat screen monitor
- V90/56k modem
- 12X NEC DV-5700A DVD-ROM & 12X8X32X Sony 160E CD-RW
- Integrated 10/100 Ethernet Networking
- Windows ME, 98SE or 2000

The first of the off-the-shelf P4 systems has hit the atomic labs – Dell's super sexy Dimension 8100 series. The first of the new wave of Pentium 4 systems to be benchmarked by us left jaws gaping at its uber-slick design and ultra-fast performance. Packed to the brim with all the latest goodies, you'll also need a bank account packed to the brim to pay for it, with an asking price of around $6,800 plus delivery for the system we tested. What do you expect for the latest in CPU, motherboard and RAM architecture, with the world's fastest graphic card and a stack of other high quality components thrown in for good measure?

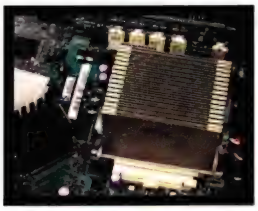
> "...left jaws gaping at its uber-slick design and ultra-fast performance."

ⓘ Shunning thick heatsink fins, the P4 instead relies upon wafer-thin leaves of metal.

The first thing that struck us was the gorgeous design of the Dell machine. The beautiful black and silver lines prove that you don't need transparent plastic to be an attractive computer. The futuristic case, with matching black flat screen 19" monitor and surround sound speaker setup all combine to make this the sexiest off-the-shelf PC setup we've had the pleasure of testing. Dell's brilliantly designed case with foldout everything also made it one of easiest to poke around in.

Beauty in the eye of the beholder

Looks count for nothing if you don't have the performance to match (unless you're Anna Kournikova), and Dell's 8100, proved through multiple benchmarks, that it wasn't just a pretty face. With a 1.5GHz Pentium 4 CPU and 128MB of PC800 RDRAM, both running over the quad-pumped 100MHz (effectively 400MHz) Front Side Bus of the new Intel 850 chipset, blazingly fast 3D performance was guaranteed. From the OpenGL powered engine of Quake 3 Arena, to the Direct3D tests of 3DMark 2000, the 8100 series leaves no doubt that rendering 3D worlds is an area this beast excels in.

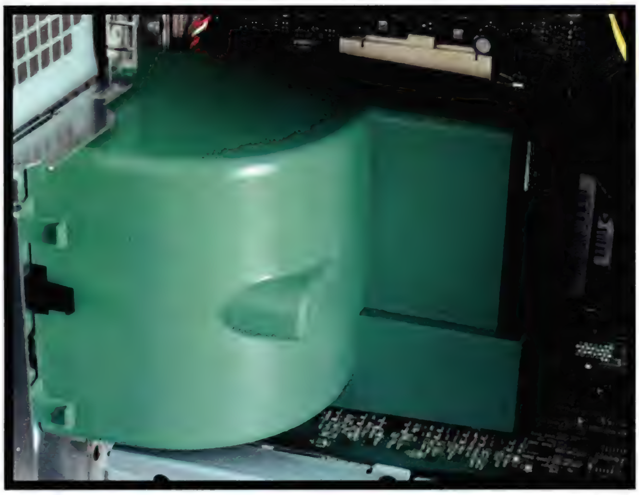


All of that CPU power and incredible memory bandwidth would be of no use without a decent video card to pass the polygons to, so the GeForce2 Ultra fits in well with the other stratospheric specs of this machine. Currently the fastest video card available to consumers, its sheer power in pumping out the pixels due to its high speed DDR-RAM helps to lift this system above and beyond the rest.

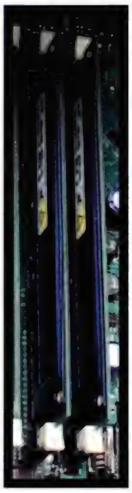
An innovative feature of the 8100 series is its THX certification. In cooperation with the men in white coats at the Lucasfilm labs, Dell worked hard to make the 8100 series the first ever complete system to be fully THX certified. They knew that while many components are rated as being THX compatible, the system as a whole is just as important as individual parts when it comes to THX quality. As a result they have paired up a high end Turtle Beach Santa Cruz DSP sound card with Altec Lansing's top of their range 885 4.1 speaker setup. It was surprising to have a machine in the labs that didn't come with a Creative card, but the sound quality of this system was amazingly crisp and pure, even at volumes you know are keeping the neighbours awake.

Throw in to this potent mix a 40GB Ultra ATA-100 Hard Drive, a 19 Trinitron tube ultra flat monitor, and a 12X DVD-ROM as well as a 8X CD-RW to spin your discs, and you are left with a very well rounded setup with seemingly no weak links in the component chain. If you can think of a component that you would like in a PC, it's most likely that this machine has it. If you don't want some of the components in the top of the line 8100, you can always downgrade almost any of these for something less expensive.

If the words "value for money" actually mean anything to you, it might be best to hold off until higher speed P4 CPUs are released and the current 1.5GHz CPUs aren't so new and hence so expensive. Hopefully the extremely high prices of i850 motherboards and RDRAM will have dropped by then. But if money is no obstacle, the Dell 8100 series comes highly recommended, being an ultra fast PC chock full of high quality components and cutting edge technology, with killer looks to match. ▢

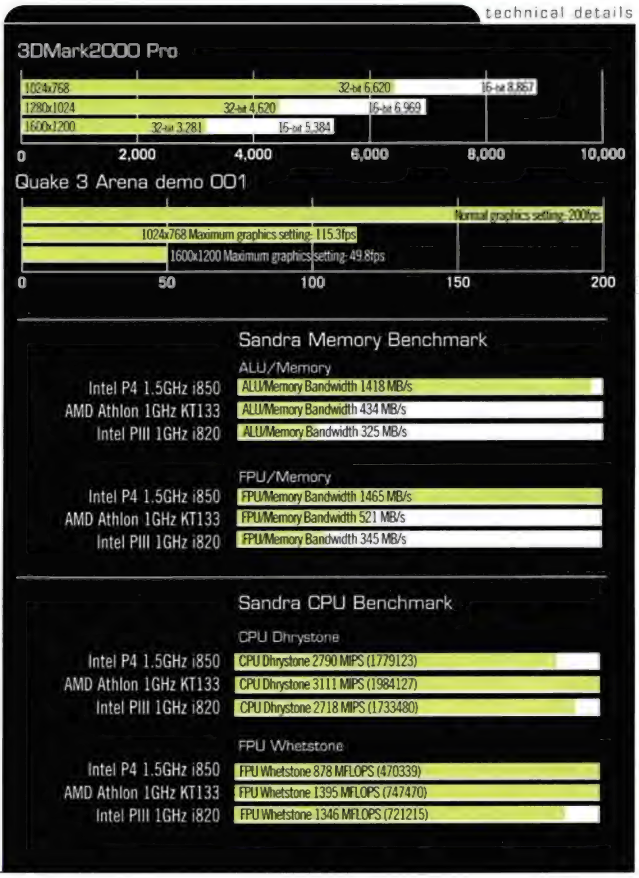


ⓘ Heat buildup is minimised by a ducted cooling system over the CPU.



ⓘ RDRAMis so cool that it's actually blue.

technical details

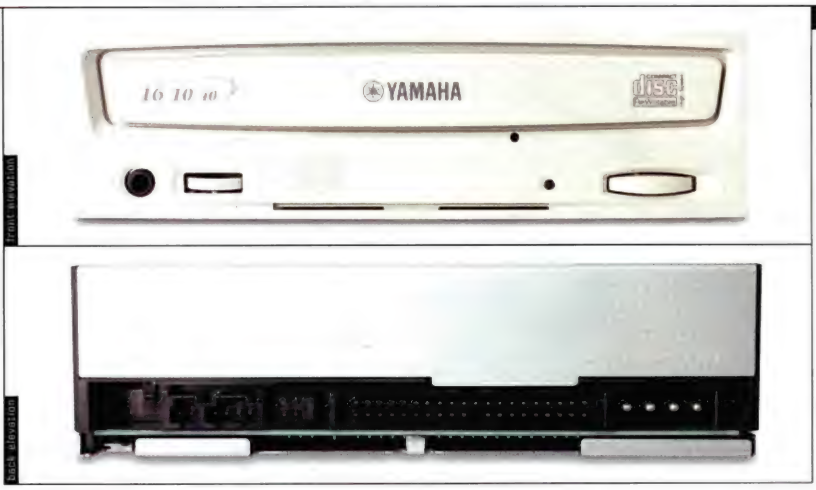


atomic

8.5/10

Yamaha CRW2100EVK

The fastest CD burner to date has hit the atomic labs.



specification

- ATAPI (E-IDE) 16 10 40 CD-R/RW
- Bundled with Adaptec Easy CD Creator 4, Direct CD and Take2 CD Backup Utility
- Capable of backing up just about any CD media type.

"Burn a CD in around five minutes". That's the claim made about the new Yamaha CRW2100E CD-R/RW drive. Rated at 16x write, 10x rewrite and 40x read, this drive sits at the bleeding edge of home burning technology. But does it live up to its big claims?

The drive is a tray-loading internal ATAPI (E-IDE) model with Ultra SCSI and IEEE 1394 (FireWire) models following. It features 40x CAV read, 16x P-CAV write and 4x-10x CAV rewrite technology.

Whilst not including specific buffer-underrun protection, compensation comes with a huge 8Mb buffer. Yamaha claims that the drive supports writing in DAO RAW mode. When software support for this is available the drive will be the ultimate backup solution for **any CD media**.

Tests were run to determine the reading speed and quality of the drive. This was done both with CD Speed 99 benchmark and by running a series of digital audio extractions using specially developed Fast Audio Rip software, which is a free download (www.nero.com/yamaha/yamaha.htm) for CRW2100E owners, but surprisingly wasn't supplied with the drive.

In CD Speed 99 (www.cdspeed2000.com) reading tests the CRW2100E performed admirably, peaking at just over 38x read speed and averaging 29x. Extraction of a 74 minute audio CD to wave files was completed in just 3 minutes 20 seconds.

Revolutionary

For each revolution of a CD, less data passes the laser on the inside of the disc than the outside. CLV (Constant Linear Velocity) drives slow the drive motor as the laser moves to the outside of the CD, maintaining a constant flow of data. CAV (Constant Angular Velocity) drives keep the motor at a constant speed that leads to increasing flow of data towards the outside of the disc. Some drives now use P-CAV technology that involves a combination of both CAV and CLV

Universal Backup

The drive comes bundled with Adaptec's Easy CD Creator, which copes well with the 16x burning speed of the drive. The drive's burning capabilities were tested by copying a CD full of images and a slideshow was then run to ensure there were no data errors. This was run using the special Yamaha 16x test media and two widely available 8x rated CD-Rs from Imation and Kodak.

All three media types burned successfully and quickly. One of the most beneficial features of this drive is Yamaha's Optimum Write Speed Control function, which will adjust the burning speed of the drive depending upon disc capability and burning conditions. This should ensure that the drive will cope with any media thrown at it, but may take longer to burn for lower quality media.

The CRW2100E is an impressive piece of hardware. Combining rock solid read performance with the fastest write speed available, this is the burner to have.

atomic 9/10

Logitech iFeel Mouse

specifications

- USB/PS2
- Optical
- Featuring 'Inertial Harmonic Drive'
- A range of selectable feedback effects

"This Force Feedback crap is getting totally out of hand, what's the friggen point?" I somehow managed to type this, despite the violent shuddering of a Force Feedback Keyboard.

Speaking on behalf of Logitech, an iFeel press release catagorically stated that I would feel "varying impulses when you run the iFeel mouse over icons, pull-down menus, hyperlinks, menu items, dragging/resizing, etc".

"Well that seems harmless enough, so, is it little electric motors inside, then?"

Nothing is ever so simple. "The vibrations are generated through a combination of Logitech's proprietary hardware and Immersion's high fidelity Inertial Harmonic Drive engine."

"Engage the Inertial Harmonic Drive!" I screamed. Harnessing the universes' energy and releasing it as a singularity of feedback, the iFeel mouse went 'bink'. I mindlessly ran the cursor over my desktop icons. 'Bink bink bink'. Hey, this is kind of nice... Stretching a window – 'brrrvip' Scrolling through my email inbox – 'buddabudda'.

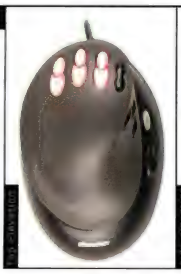
When used on a bare surface, it sounds exactly like a Geiger counter, which is either cool or annoying, depending on how you look at it. ○

atomic
6.5/10

Microsoft Strategic Commander

specifications

- USB interface
- Comes with preset game configurations
- 3 shift buttons which triples functionality to a total of 24 buttons
- Twist, zoom and move controls



Aimed squarely at the RTS market, the Strategic Commander is a unique beast. Sitting under the left hand it provides both directional movement and configurable buttons to make the gaming experience silky smooth.

Installation is simple, as long as you follow the step-by-step install program on the supplied CD. Using a USB interface, the controller is completely customisable via a software control panel. Packaged with a set of "game profiles", preset configurations for popular games, more are available for download at the Strategic Commander Web Site in order to keep up to date.

Control is disconcerting at first, using the left hand to scroll whilst the right hand uses the mouse pointer can result in a feeling not unlike seasickness. This soon passes and becomes second nature. The six buttons are easy to use and configure, with three shift buttons expanding the functionality to a total of 18.

This controller is made for strategy, and for strategy it is perfect. We fired up Age Of Empires II using the supplied game profile and gave the controller a workout. The only gripe is that the movement sensitivity needs a lot of tweaking to become comfortable.

Overall the Strategic Commander provides a slick and simple controller for your strategy needs. Apart from some gripes about the smoothness of control, the controller provides a very comfortable way to control your armies and resources. ○

atomic
8/10

Ultra fast, Ultra expensive

Blindingly fast performance usually comes at a price, and the GeForce2 Ultra is no exception

If NVIDIA had kept to its release schedule, this would be a review of its new chipset, codenamed the NV20. Unfortunately, this impressive new chipset has been delayed for numerous reasons, number one in our minds being that they didn't need to release it yet to stay ahead of the pack, especially with 3dfx's decision to scrap the Voodoo5 6000. In the interim, ensuring there is at least some new NVIDIA gear in Xmas socks this summer, it has released a revision of their popular GeForce2 GTS (GTS), known as the GeForce2 Ultra.

The Ultra is identical to the reference design of NVIDIA's 64Mb version of the GeForce2 GTS with two major exceptions – it has a higher core speed, and faster DDR memory. Being identical to the GTS means it includes such features as second generation hardware T&L (Transform and Lighting), real-time per-pixel shading as well as HDVP (High-Definition Video Processing). FSAA (Full Scene Anti-Aliasing) is also included as a software function of NVIDIA's drivers. AGP speeds of up to 4X is also standard.

The Ultra has a default core speed of 250MHz compared with the standard GTS core speed of 200MHz. This has resulted in a 25% increase in theoretical performance, from 25 million up to 31 million triangles that the Ultra can push around per second.

Specification

Memory: 64Mb 460MHz DDR RAM
Core: NVIDIA GeForce2 Ultra @ 250MHz
RAMDAC: 350MHz
Cooling: Core – heatsink and fan
Memory - heatsinks

Memory bandwidth is the key

Overclockers soon discovered that overclocking the core from 200MHz up to 230MHz yielded little to no improvement in frame rates of 3D games. But as soon as the memory was overclocked, performance increases were gained, highlighting that the memory was the bottleneck in the GTS.

This is why the Ultra ships with DDR RAM which is around 39% faster than the original GTS. With a default speed of 230MHz (effectively 460MHz due to it being DDR) compared to the original GTS's 166MHz (effectively 332MHz DDR), it is this higher speed memory that really sets the Ultra apart from the crowd.

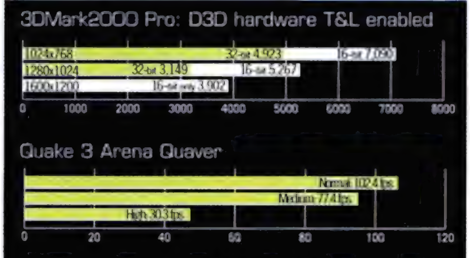
We tested the Ultras on an A7V with a 1GHz Athlon and 128Mb of PC133 RAM. At resolutions of 1,024 x 768 and lower, there is a small increase in frame rates from the GTS up to the Ultra. From the Q3A timedemos we can see an increase of around 20% in frame rates at this resolution. The 3DMark2000 Pro benchmarks showed a less impressive increase in frame rates of around 11% at this resolution. However at 1600 x 1200 it's a different story, with the Ultra leading by around 53% for the OpenGL test and 32% for D3D.

NVIDIA have released the fastest card available to consumers, but at the cost of having to release an expensive end product. But if you have the resources, there simply isn't a faster card available.

Reference cards

To highlight the speed increases of the new Ultra cards, we thought we'd kindly show you some benchmarks of our reference GeForce2 GTS card, the Hercules 3D Prophet II GTS 32MB.

technical details

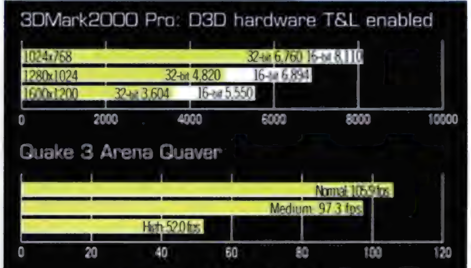


Single Texture fill rate: 568.3MTexels/s
Multiple Texture fill rate: 1172.4MTexels/s

Overclocking Performance

We overclocked the memory from 460MHz to 500MHz and the core from 250MHz to 275MHz, then ran the benchmarks again. From the results you can see that it is definitely worthwhile overclocking these cards.

technical details



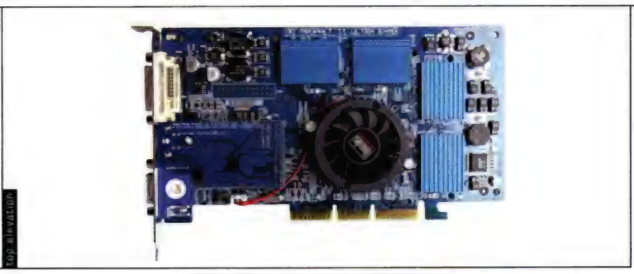
Single Texture fill rate: 864.2MTexels/s
Multiple Texture fill rate: 1754.9MTexels/s

Hercules 3D Prophet II Ultra 64Mb

specifications

Software:
- PowerDVD
- Hercules 3D Tweaker
- 3Deep

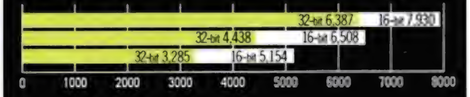
Features:
- AGP 2X/4X with fast writes
- 64Mb 460MHz DDR-RAM
- TV-OUT & DVI-OUT



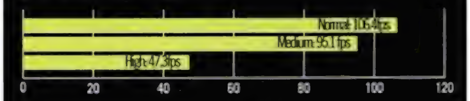
Just as with most cards based on an NVIDIA reference design, there isn't much separating the different manufacturers' Ultras, in terms of performance. Hercules has a slight edge over the others when it comes to frame rates, but the differences really are minimal. The Hercules Ultra memory was able to be overclocked to 500MHz from the default 460MHz, whilst its core was able to reach a maximum speed of 275MHz, from 250MHz. The Hercules came with TV-out and DVI-out as standard, unlike the Creative card, so for those with televisions or LCDs that they wish to game on, the Hercules is the more suitable of the two. ○

technical details

3DMark2000 Pro: D3D hardware T&L enabled



Quake 3 Arena Quaver



Single Texture fill rate: 780.8MTexels/s
Multiple Texture fill rate: 1,596.3MTexels/s

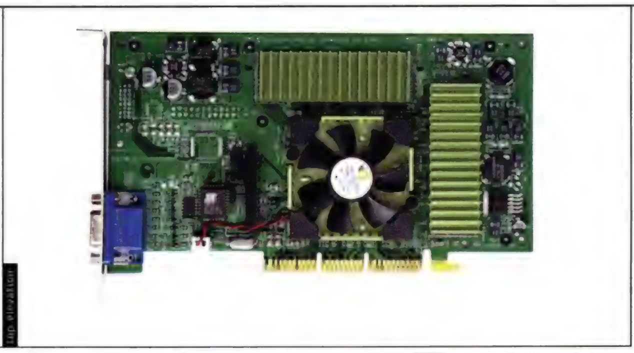
atomic
8.5/10

Creative 3D Blaster Annihilator 2 Ultra

specifications

Software:
- Creative Enhanced Blaster Control 4
- GeForce2 Experience Demos

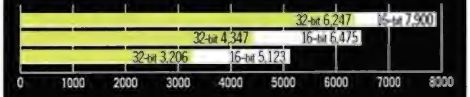
Features:
- AGP 2X/4X with fast writes
- 64Mb 460MHz DDR-RAM
- 250MHz GeForce2 core



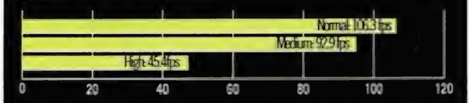
As we expected, the Creative Ultra benchmarked almost identically to the Hercules Ultra. The Creative was slightly slower, but due to the cards both being very close to the reference design the difference was less than 1% in most of our benchmarks. Again, this Ultra comes with almost zero software and is lacking the extra outputs of the Hercules Ultra. Thankfully it overclocked just as well, reaching 500MHz for the memory and 275MHz for the core. With both having minimal software packages, and with almost identical performance the Hercules Ultra gets our recommendation over the Creative Ultra due to its extra outputs. ○

technical details

3DMark2000 Pro: D3D hardware T&L enabled



Quake 3 Arena Quaver



Single Texture fill rate: 765.2MTexels/s
Multiple Texture fill rate: 1,557.5MTexels/s

atomic
8/10

intel inside
pentium 4

Deathmatch!

1.5GHz Pentium 4 RAMBUS vs. 1.2GHz Athlon DDR

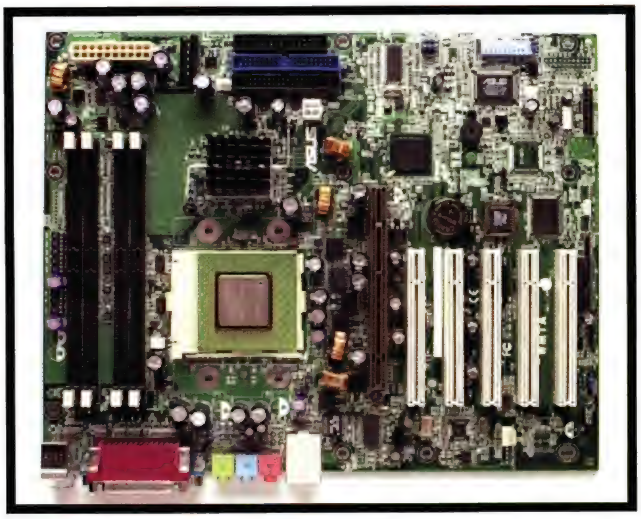
Two new PC platforms, two fierce adversaries. If they both had a fight – who would win? David Petersen, John Gillooly and Bennett Ring find out...

Intel 1.5GHz Pentium 4 RAMBUS

Up until the release of the Pentium 4 (P4) processor, the core architecture of Intel's x86 processor designs has largely been unchanged. As the life cycles of each processor matures, the desired system performance gains by simply increasing the processor speed starts to diminish. In order to maintain expected performance enhancements Intel must continually develop its micro-architecture.

There are essentially two ways of improving system performance. One way is by increasing clock speed and the other is by increasing the number of instructions per clock cycle (IPC). Intel has achieved the latter by using a technique called Single Instruction Multiple Data (SIMD). The first 64-bit SIMD was introduced in 1996 on the Pentium processor with MMX and then the 128-bit SIMD single precision floating point (SSE) on the Pentium III (P6) processor however, the processor architecture still remains IA32-bit.

The processor architecture refers to the instruction sets, registers and memory-resident data structures that are public to the operating system that runs on them, such as Windows or Unix. The



Currently the only available chipset for the Pentium 4 is Intel's 850 chipset.

micro-architecture of a processor refers to the implementation of a processor in silicon. Intel's IA-32 architecture is based on the x86 instruction set and registers and maintains backward compatibility for code written for the earliest IA-32 processors. The Coppermine PIIIs were based on 0.18-micron silicon fabrication and so too will the first P4 processors.

What makes the P4 differ from earlier processor families is the introduction of what Intel calls NetBurst Micro-Architecture, but, at the same time, improving on previous Intel micro-architecture features such as "out-of-order speculative executions" and "super-scalar execution".

Out-of-order speculative execution means that P4, and earlier processors, can have several portions of code being executed at the same time and predicts where the code will branch to and speculatively executes instructions down the predicted code branch. Code branching is where the processor predicts the outcome of, for example, an if-then-else before the conditions are calculated, albeit in compiled machine code.

The P4 has improved prediction mis-match and can perform twice as many instructions in the pipeline as the P6. Also included in the NetBurst micro-architecture is an advanced dynamic execution engine that helps reduce prediction mis-match and speed up pipeline flushing when predictions aren't needed. The P4 has a 20 stage pipeline for prediction and recovery, as compared to the 10 stage pipeline for PIII and Athlon processors.

The disadvantage is that the deeper the pipeline the more executions have to be flushed and as a result wastes processor resources. The advanced dynamic engine improves mis-predictions by about 33 percent over the P6.

The execution trace cache is also new to the P4 and is a Level 1 instruction cache used to decode x86 instructions and removes some of the latency associated with the instruction decoder from the main execution loops. The addition of a rapid execution engine and Arithmetic Logic Units (ALUs), which does the integer calculations, runs at twice the speed of the processor.

The P4 also has an advanced Level 2 transfer cache of 256Kb. The data throughput from cache to processor is 256bit (32 byte) and transfers data on each core clock. This gives a 1.4GHz P4 a transfer rate of 44.8Gb/s, as compared to a 1GHz Pentium III transfer rate of 16Gb/s.

With the streaming SIMD Extension 2 (SSE2), the NetBurst micro-architec-

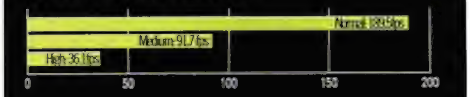
RAMBUS RIMM, the Intel choice of RAM. These RIMMs need to be paired, and also need special "continuity" RIMM modules in empty slots.

technical details: Pentium 4

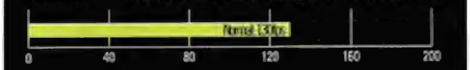
Testbed setup

- **1.5GHz Pentium 4 CPU**
- **Dell i850 motherboard**
- **2 x 64Mb PC800 RD-RAM**

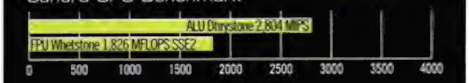
Quake 3 Arena demo 001



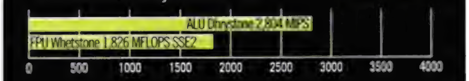
MDK2 **320x200, lowest texture setting, hardware T&L disabled**



Sandra CPU Benchmark



Sandra Memory Benchmark



atomic Applications Benchmark

3.08

ture extends the SIMD capabilities that MMX and SSE provided by adding 144 new instructions.

The P4 will initially ship with a 423-pin format using the Intel 850 design. This motherboard is based on the i840 chipset but with a new memory controller (MCH/North Bridge) and using a quad pumping transfer rate over a 100MHz clocked system bus allows for a sustained 400MHz data transfer rate. Users will, obviously, need to upgrade their motherboard.

This allows Dual RDRAM channels to provide 3.2Gb/s, as compared to the 1.06Gb/s on the Pentium III's 133MHz system bus. More affordable SDRAM and DDR versions are planned to appear this year.

More advanced versions of the P4, codename Norwood, will have a 578-pin design with speeds over 2GHz.

A new ATX case will be required to house the motherboard and a large heatsink, which is mounted directly to the case. A compatible P4 power supply will also be required so upgrading is not going to be simple or cheap.

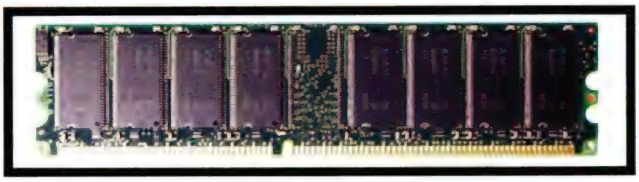
AMD 1.2GHz Athlon DDR

Rather than a whole new micro architecture AMD have introduced a new motherboard chipset, the AMD-760. Incorporating both a new Northbridge and a new Southbridge, the AMD-760 incorporates support for existing Athlon processors as well as the new 266MHz FSB Athlons.

The only major new feature of the AMD-766 Southbridge is added support for Ultra DMA 100 hard drives. The AMD-761 Northbridge has undergone significant change. Also implemented is support for 4x AGP and DDR (Double Data Rate) RAM, as well as support for the new 266MHz Front Side Bus.

DDR RAM is an evolution of the existing PC133 SDRAM. It effectively doubles the throughput of the RAM by using the rising as well as the falling edge of the clock signal, much like the EV6 bus or 2x AGP. The powers that be have decided upon a new means of naming DDR RAM, basing the names upon data throughput rather than the bus speed used for PC100 and PC133 SDRAM. DDR RAM comes in two different variants, PC1600 DDR, which runs at 100MHz DDR and provides 1.6Gb/second of throughput, and PC2100 DDR, which runs at 133MHz DDR and provides 2.1Gb/second throughput.

Physically DDR RAM resembles SDRAM, with a different pin configuration. The manufacturing process is also similar, so the prohibitive costs incorporated with other solutions such as RDRAM are avoided. There is also wide industry support for this new standard.



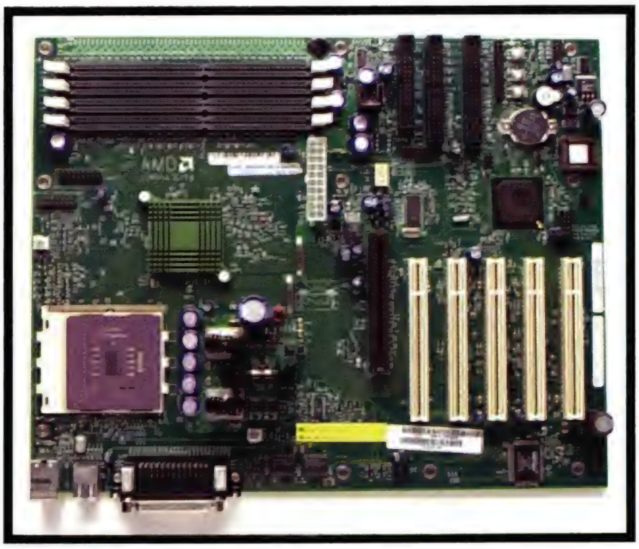
ⓘ DDR RAM, one of the building blocks of AMD's 760 chipset. The DIMM closely resembles existing SDRAM with a different pin setup.

> "...incorporates support for existing Athlon processors as well as the new 266MHz FSB Athlons."

The new DDR platform adds another performance boost to the Athlon, which has regained prominence since the introduction of the Thunderbird core. One of the major bottlenecks of the Athlon was the use of off-die L2 cache, which was limited to running at on third of the CPU speed. This major bottleneck was addressed in the Thunderbird core by introducing 256k on-die L2 cache running at CPU speed.

Via are also working to introduce DDR based chipsets for both the PIII and Athlon in the near future. DDR support for the Pentium 4 is also planned in the near future.

AMD plans to introduce its new micro architecture, codenamed Palomino, around the middle of this year. They are tight-lipped as to what changes this will entail, only to say that the notorious AMD power consumption should be greatly reduced. It remains to be seen how this will compare with the changes in micro architecture seen in the P4.



ⓘ The AMD 760 chipset powers the new DDR systems.

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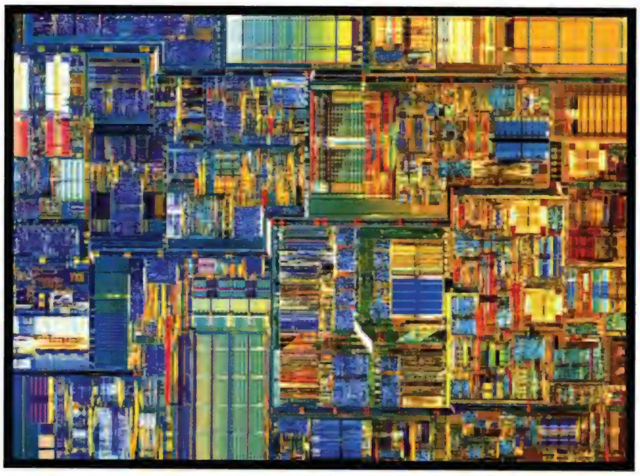


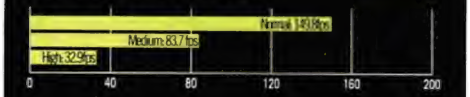
> "...not all OpenGL games share the same P4 performance increase that Quake 3: Arena has."

The P4 in all its glory. Currently the chip uses a 0.18 micron process, but Intel is moving the manufacturing to a 0.13 micron process early this year.

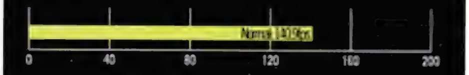
technical details: Athlon

Testbed setup
- **1.2GHz 266MHz FSB Athlon**
- **760 chipset motherboard**
- **128Mb PC2100 DDR-RAM**

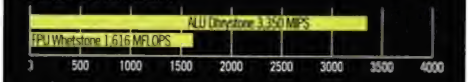
Quake 3 Arena demo 001



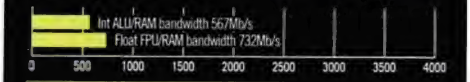
MDK2 320x320, lowest texture setting, hardware T&L disabled



CPU Benchmark



Memory Benchmark



atomic Applications Benchmark

3.83

The Big Fight

Comparing these two very different platforms was no easy feat, as the P4 excels in certain areas while being surprisingly slow in others. The Athlon was much simpler to test, since it has a more linear increase in performance across all benchmarks. To combat the varying results of the P4, we ran a wide range of benchmarks. Tests run at lower resolutions, chosen specifically to minimise the influence of the video card showed most acutely the performance differences between the P4 and the DDR Athlon.

3DMark2000 Pro was the first benchmark to get the P4/Athlon treatment, with some surprising results. The Intel PIII setting was chosen as the CPU optimisation for the P4, as MadOnion hadn't yet released an SSE2 optimised version. The Athlon tests were run using, you guessed it, Athlon CPU optimisations. At 640 x 480 resolution and 16-bit colours and textures, the P4 scored 6,945, slightly below the Athlon's 6,984. Other resolutions up to 1,600 x 1,200 at 32-bit colour show a similar pattern, with there being almost no performance difference between the Athlon and the P4 despite the P4 being clocked 300MHz faster than the Athlon.

Next up was the benchmarking favourite Quake 3 Arena, which makes use of SSE optimisations due to it's OpenGL engine and also demands high system and memory bandwidth to run smoothly. As such, the P4 managed to score 189.5fps at 640 x 480 resolution in demo001, an impressive 40 frames per second faster than the Athlon's 149.8 fps. Even at 1,024 x 768, where the graphics card began to hold the CPU back, the P4 still outscored the Athlon by a clear eight frames, with 91.7fps compared to the Athlon's 83.7fps.

We wanted to test if this impressive performance difference was true for all OpenGL-based games, so the next application to be dusted off was Shiny's MDK2. Much to our surprise, the Athlon actually beat the P4 by 11fps at 320 x 200 resolution and 16bit colour and textures, with the P4 scoring 130fps compared to the Athlon's 140.9fps This makes it quite apparent that not all openGL games share the same P4 performance increase that Quake 3 Arena has.

SiSoft Sandra 2000 Professional was used to synthetically benchmark both the CPU and the memory bandwidth of the two platforms, as it gives more component-targeted scores. We used the latest version that incorporates optimisations for both the Athlon and the P4.

The CPU benchmark in Sandra showed that the Athlon is much faster at raw integer calculations, scoring 3,350MIPS (Millions of Instructions Per

Second) compared to the P4's 2,804MIPS, a full 19.5 percent slower than the Athlon. This is very surprising considering the extremely high speed (3GHz) of the ALUs within the P4. This first CPU test also measures the raw floating point performance of the CPU, and it is here that we can see our first positive result of SSE2 optimisations on the P4. Without SSE2 optimisations, the P4 scored a lowly 893MFLOPS (Millions of Floating Point Operations Per Second) compared to the Athlon's speedy 1,616MFLOPS, which is almost double the score of the P4! Enable SSE2 optimisations and the P4 becomes much more impressive at floating point performance, rising from 893MFLOPS to an Athlon-beating score of 1,826MFLOPS. This highlights the P4s need for properly implemented SSE2 optimisation in order to utilise the maximum potential of the CPU and its advanced cache and provide a tangible increase in performance.

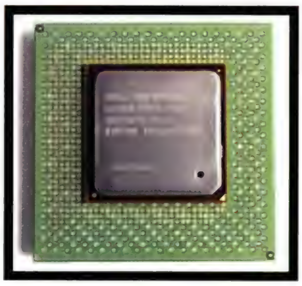
Next up was another MadOnion product, Video2000, using PowerDVD v2.5 for all DVD decoding. Unfortunately the version we used hadn't yet been optimised for SSE2 instructions, but as a result this test should indicate video performance of the CPUs using today's software, not the SSE2 optimised programs of tomorrow.

The performance score given at the end of the Video2000 benchmarks is the important result of the package, and once again the P4 trails behind the Athlon, albeit by a small margin. The Athlon scored an impressive 1,055 VideoMarks as opposed to the P4's 992 VideoMarks, highlighting that MHz measurements are becoming increasingly irrelevant when used to describe a CPU's computational power.

Finally we tested using the atomic Applications Benchmark, which is comprised of multiple real world 2D and office applications ranging from Excel through to Photoshop, although none of which utilise the SSE2 instruction set yet. But again, for this very reason, it will provide a more accurate representation of how the two platforms will perform with software that is in use today, not software that may or may not be released in the near or distant future. And once again the Athlon beat the higher MHz rated CPU, scoring 3.83 compared to the P4's 3.08, indicating that for office application performance, the 1.2GHz Athlon is king of the hill.

We were supplied with several benchmarks by Intel that were optimised specifically for the SSE2 instructions of the P4. We ran several of these benchmarks, and unsurprisingly the P4 wiped the floor with the Athlon for the majority of these tests. An example of this was the Incoming Forces benchmark, with the P4 scoring an impressive 147fps compared to the Athlon's 86fps.

Whilst we did test with these, we eventually decided not to include the results for the majority of the Intel tweaked benchmarks. It's simply unfair to the Athlon to test it with software that has been specially optimised for the P4. If SSE2 instructions do heavily penetrate the market before AMD have their own SSE2 compatible CPU on the market, and really do increase the performance of the P4 as much as Intel promise, you can be sure we'll let you know.



A pre-release Pentium 4 sample, smuggled out of Costa Rica by our team of atomic agents.

The Final Verdict: AMD DDR 1.2GHz Athlon

Considering the new architecture of the P4, we were quite surprised that the 1.5GHz P4 rarely outperformed the 1.2GHz DDR Athlon by anywhere near a significant margin, and in fact lost out to the Athlon in many of the tests. Tests utilising SSE2 instructions showed that performance increases can be gained via their use, but these gains do not always lift the P4 above the Athlon. Considering the massive price premium the P4 has over the Athlon, as well as the results of our benchmarking and the amount of time it will take for SSE2 optimisations to really take hold in popular software, we have to recommend the DDR Athlon platform over the P4 – at the moment. Unfortunately for AMD, the Athlon is reaching the top of its performance ceiling, with a whole new chip design required to lift AMD CPU speeds significantly higher. This is in contrast to the new P4 architecture, which was designed specifically with scalability in mind, making speeds of 2GHz or above possible in the near future. At these speeds, there is no doubt that the P4 will beat the 1.2GHz Athlon in the vast majority of tests, but by that time AMD's new SSE2-enabled Palomino CPU should be out, giving Intel a further reason to worry. For the second time now, AMD seems to have beaten Intel at it's own game but as the P4 ramps up in speed over the next six to twelve months, it might prove to be a short lived victory.

Voice Comms

Stop typing and start talking.

ⓘ By using shareware voice comms your money can be focused towards your choice of headset.

Whilst online gaming can be a very sociable activity, the traditional method of text based communication between players has proven to be a strong barrier to people interacting in ways more meaningful than firing virtual slugs through their counterparts' faces. Enter Voice Communications. In fact, it isn't really a new entry – voice comms programs have been out for over 18 months. But it is only now, as the average sound card becomes more advanced, incorporating such features as full duplex mode, and as word of the brilliance of a select few applications has spread, that they are receiving the limelight they deserve.

Microsoft has recently entered the field with its Game Voice kit, including a custom USB channel-switching pad. So we thought we'd pit this against two of the most popular shareware voice comms programs used in virtual battlefields across the globe, Roger Wilco and TeamSound.

atomic	Installation/Compatibility	Voice quality	Bandwidth / Latency issues
Roger Wilco www.resounding.com Free to download + cost of headset ($12-$100)	If you want to start hurling abuse at your online pals as quickly as possible, this is the one to use - it is by far the easiest of the three to setup. Being the older brother of the bunch means it is also the most compatible.	Whilst not quite telephone quality, the voices of your team mates will ring clear through your speakers, even with cheap headsets in use. Definitely the clearest of the three over a dial-up connection.	The biggest problem with Roger Wilco is the increase in latency dial up users experience while transmitting. Broadband users won't suffer the 100-200ms increase in ping that dial up users will notice.
Team Sound www.teamsound.com Free to download + cost of headset ($12-$100)	Installation of TeamSound was more complicated than the other two programs, with many more hardware setup steps in a less than intuitive manner. It also preferred newer soundcards.	When set to the broadband rate, voice quality was as good as Roger Wilco. Unfortunately, when set to the dial-up rate the quality dropped dramatically, breaking up often and being quite distorted.	Again, broadband users won't notice an increase in pings when using TeamSound. Dial-up users are also in luck with TeamSound, with pings rising by only 15-30ms when transmitting.
Microsoft Game Voice www.gamevoice.com Approximately $100	A few quirks, such as self-adjusting volume controls, stopped the Game Voice from being simplest to install. Also, it only supports stereo sound - not good considering so many people now have 4 speaker setups.	Oh dear. They can't be seriously trying to sell something that sounds so bad compared to the free alternatives. Tinny and distorted regardless of compression rate, being equally poor for both dial up and broadband users.	Both dial-up and broadband users shouldn't notice anything more than a 20ms increase when transmitting. But with voice quality this bad, who cares?

Radio Channels

Radio channels enable you to separate who you speak to into groups. This allows you to set the enemy on one channel, for advanced psychological warfare and the occasional taunt, whilst having your own team on another, to discuss tactics and share the occasional victory hoot. For larger games, the team can be broken down into smaller channels, for example, the offensive element of the team is assigned channel one whilst the defensive element is assigned channel two.

Game Voice Command mode

The Game Voice has an interesting feature called command mode. The user records several voice commands that are bound to keyboard functions, such as lowering landing gear or changing weapons. Whilst fun to use at first ("Give it to me baby" to change to the BFG in Q3A was a fave) the slight pause between issuing the command and its actual activation meant it was unsuitable for time critical commands.

ⓘ The Game Voice comes with a high quality headset, built by Plantronics, best known as the supplier of headsets to NASA.

ⓘ The Channel Selector allows for fingertip control of the Game Voice software.

Ease of use	Channel selection	Verdict
So simple to use it's just not funny. Without a channel function, it's simply a matter of pressing a single, user-allocated key to transmit. Its ease of use makes it a great introduction to the world of voice comms.	Roger Wilco supports one channel only, so for team games is only useful for speaking to teammates (unless you don't use it for tactics and just want to yell at the opposition!).	For people who are new to voice comms or are limited to a 56k connection, Roger Wilco is the program to chat with. The small cost of a headset is definitely worth the entry fee for this amazing software. Once you have sampled the delights of voice comms, and become comfortable with communicating with your online competitors, you may find its lack of a channel function holding you back. atomic 8.5/10
The hardest of the three to use, due to its channel creation and selection process. Whilst not exactly easy to use, luckily you don't need to be a rocket scientist to figure it out.	TeamSound supports multiple channels. Keys are bound by the user to certain channels, in a slightly confusing manner. Once they are set up though, selecting them is simple.	TeamSound is the professional soldier's comms program of choice - as long as they are equipped with standard military issue broadband. Its clear transmissions and channel system make it a winner in any tactical situation. Unfortunately dial-up users will find the sound quality inferior to that offered by Roger Wilco, but at least TeamSound won't affect their pings as badly. atomic 8.5/10
Being voice activated means no keys need to be pressed to speak. It also means more background noise is transmitted. The channel selection unit makes selecting channels simple, and the software is quite intuitive.	Supporting multiple channels, the Game Voice comes with it's own custom USB channel selection device. You will always know which channel you are transmitting to via the pretty glowing lights.	Sure, it's got a high quality headset and curious USB channel selection gadget, but its poor voice quality is the Achilles heel of the Game Voice. Considering this is the only voice comms application that isn't free, it is unforgiveable that it has the worst voice quality of the lot. atomic 6/10

Lie back, tell us your problems...

Here in the atomic labs, we spend a lot of time opening things up and tinkering around inside. We also like to push our OS and software as far as it can go. That means when things go wrong, which they always do, we are well equipped to get them back up and running as well, or even better than before.

We want to solve your problems as well, as we sense you have many. So gather together your toughest and trickiest problems and send them our way. Of course the most impressive problem each month will win a specially selected prize.

Being our first issue, here are a few fake letters to kick things off:

i I recently decided to upgrade my Pentium 166 to a new Athlon Thunderbird 1GHz chip. However, try as I might, I cannot get the Athlon to fit into the CPU socket of my motherboard. I was wondering whether there was some sort of adapter that I can find to connect my new processor?

L337 H4X00R
Melbourne, Vic

"...I cannot get the Athlon to fit into the CPU socket of my motherboard."

o Pentium motherboards used a format known as Socket 5. Current Athlons use a format known as Socket A (some OEM Athlons still use the Slot A format). These socket formats are generations apart and are completely incompatible. Moving from a Pentium to an Athlon Thunderbird will involve a new motherboard, new RAM and probably a new power supply unit as a bare minimum.

i Heya atomic ppls, I juzt got a new game which looks really kewl and I wanna play it coz it is good but

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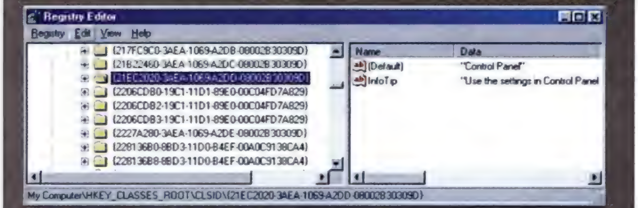
Funky Control Panel



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```

Name	Data
(Default)	"Control Panel"
InfoTip	"Use the settings in Control Panel

My Computer\HKEY_CLASSES_ROOT\CLSID\{21EC2020-3AEA-1069-A2DD-08002B30309D}

In Windows ME users are given a lot more control over the Start Menu than in previous iterations of Windows 9x. One of the more useful functions is the ability to expand the control panel from the start menu rather than it launch a separate window.

To do this in Windows ME go to Start, Settings, Taskbar and Start Menu. In the window that opens select the advanced tab and then check the option marked expand control panel (this resides in the scrollable box at the bottom of the window).

This can also be done in Windows 98 quickly and easily. Go to Start, Run... type Regedit and click Ok. Once Regedit opens click edit, find and search for the words "control panel".

When the search finishes look in the left hand window for the open folder. Right click on the folder name and select Copy Key Name. Close Regedit.

Now right click on the Start button and select Open. Right click inside the window that opens and create a new folder. When naming this folder type Control Panel then a full stop and then paste the registry key. Delete the text HKEY_CLASSES_ROOT\CLSID\ from the name. The folder name should now be Control Panel.{21EC2020-3AEA-1069-A2DD-08002B30309D} . Hit enter and the folder name will change to Control Panel and the folder icon will change.

Close this window and click on the Start button. You will now have a control panel icon on the start bar that will expand out to show the options on a menu.

Of course there is a slightly more easier way to do this, which involves skipping through this article and just manually typing in the key name when creating the shortcut. However, by learning how to find the registry key you are now free to experiment by searching for the names of other windows components and creating expandable shortcuts for them.

I need a CD key which I cant find but you guyz could give me out one couldn't you coz you guyz are really kewl.
(P.S.) I really bought this game.
(P.P.S) What is an .ISO file?
Timothy Mullupington III
Sydney, NSW

From whatever angle you look at it, piracy is bad. Besides the illegality of it, game sales often determine the future path of development. A poorly selling but widely played game will not have the same level of support as a high selling one.

A CD key is used as a copy protection measure. For games such as Quake III: Arena and Half-Life, your CD key is used for authentication purposes when playing online. If someone is using that key already then the odds are that you won't be able to play.
The solution to your problems: buy the game.

I have a problem. I am an avid first person shooter player, but find myself accidentally hitting the Windows key when playing. This of course dumps me out of the game and means that I lose crucial frags. Is there any sort of solution to my problem? I have looked at buying a new keyboard but they all have Windows keys nowdays...
pHatYdixXx
Via email

The best solution I have seen yet to the "accidentally hitting the Windows key" problem is an easy, but permanent solution. The tool needed: a solid screwdriver. Wedge this under your Windows key and lever the key off. This will stop the dropping back to Windows woes, but it will also prevent you from ever being able to hit the Windows key again. »

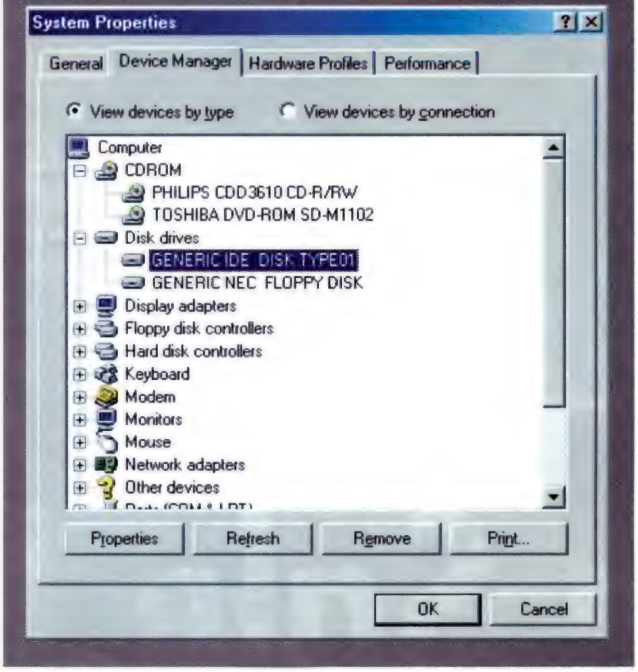
Hints and Tips: Windows 9x and ME

■ If Scandisk running whenever you have a bad shutdown annoys you, you can disable this by going to Start, Run... and typing msconfig in the window that opens. Hit OK and the system configuration utility will open. Click on the button marked Advanced.... Another window will open. Click the "Disable Scandisk after a bad shutdown" checkbox and you should never be bothered by Scandisk again.

■ Whenever you are planning on using regedit it is a good idea to make a backup of your registry. This can be done when the regedit window opens by selecting Registry, Export Registry File... then naming and saving the file. Make sure that the All radio button is checked in Export Range.

■ In NVIDIA's Detonator reference drivers you can enable card overclocking and some other enhanced functions, including the ability to disable vsync by adding some information to the registry. Run regedit and navigate to HKEY_LOCAL_MACHINE\SOFTWARE\NVIDIA Corporation\Global\. Right click on Global and add a key called NvTweak. Add a new DWORD value under this and call it CoolBits. Right Click on this and select modify. Change the value to 3 (leaving this as hexidecimal). This will enable extra options in the advanced settings of the NVIDIA tab in display properties, allowing you to disable VSync in Direct3D, and overclock your card. Of course be careful if you try overclocking, this will most likely void your video card warranty, and the feature is of course unsupported by NVIDIA. The specific functions unlocked by CoolBits can vary can vary between Detonator driver releases.

■ One of the most essential, and instantly noticeable optimisations for hard disk and CDROM drives involves the enabling of DMA (Direct Memory Access). This is not enabled by default, however it is incredibly easy to enable. Open Control Panel, System and then go to the Device Manager tab (as shown in the image below). For each drive (excluding the floppy drive) navigate to Properties, click the Settings tab and then click the DMA checkbox. Repeat this for your other hard disk and CDROM drives and then restart the computer.



ⓘ Most CD and hard drives benefit greatly by enabling DMA via the Device Manager properties.

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Gnu Fella
Via email

"...the lights in my street dim every time the fans spool up"

Unfortunately, most of the newer games out there lack proper Telnet support. May we suggest any game which proudly boasts about its leading edge parser. Generally if the games starts off with you outside a house facing a letterbox you are onto a good thing. You may be able to find one or two games using advanced 3D graphics technology but the chances are slim.

For those puzzled by the bizarre writing style used in this letter please look at our informative guide to |337 speak on page 98.

I recently decided to cool my computer by adding some fans. Let's face it, I went overboard. My CPU now operates at 15 degrees, but the lights in my street dim every time the fans start. Is there a quick solution?

Hot and Bothered
Perth, Western Australia

There is no easy solution to the obviously insane power drain. Perhaps a small nuclear reactor would be a useful step.

I am recently upgraded to a 19 inch flat screen monitor which is supposedly capable of ultra high refresh rates at high resolutions. However in my display properties I can only select Optimal and Adapter Default. How can I select other rates?

Lin Sablum
via email

Low refresh rates have subtle but significant effects such as increased eyestrain and graphical anomalies in some 3D games. The general rule is to use the highest refresh rate possible. Whilst some video card drivers let you control refresh rates, Windows does not give you this control normally. You will need to get you hands on some specialist software. I suggest a small program called HZ tool, which can be found on the internet at: hem.spray.se/doxx/

ICQ2000b database backup

Over time, an ICQ contact list can bloat to the sort of size where manually re-adding contacts after a new install becomes almost impossible. Your ICQ history can also be an important reference for both sentimental and business reasons.

If you are faced with a reinstall of ICQ or an upgrade to a newer build you can save on hassles by backing up your ICQ database. The other main benefit of this is that you can save on having to be re-authorised by people on your list.

There are two directories that need to be backed up. One is named 2000b and the other UIN. These are contained in the directory in which IC is installed. By default this is C:\Program Files\ICQ. Also make sure you write down your UIN (ICQ number).

Once these two directories are backed up to a safe location, you can proceed with any reinstalling or reformatting needed.

After you have installed ICQ again copy the backed up 2000b and UIN subdirectories to the newly installed ICQ directory. Run ICQ and when prompted click on the Register Existing User option.

Enter your UIN and password then hit next. Follow any prompts - including setting up your connection details. When this is completed your contact list should be back up and running as it was before you reformatted.

Hardware Tips: Keeping Cool

- **When installing case fans, take care to remember simple physics. Hot air rises, so extraction fans at the top of the case are a good idea.**
- **If you have a GeForce2 MX card and are looking at overclocking, check to see whether the card comes with a fan, most are supplied solely with a heatsink. A good video card fan is a cheap and effective solution to overheating problems.**
- **Always remember that while thermal paste is vital for the health of your components, it isn't as kind on you. If you get paste on you wash it off immediately, and remember, it may look like a mini tube of toothpaste but it isn't minty fresh, it's just plain toxic.**

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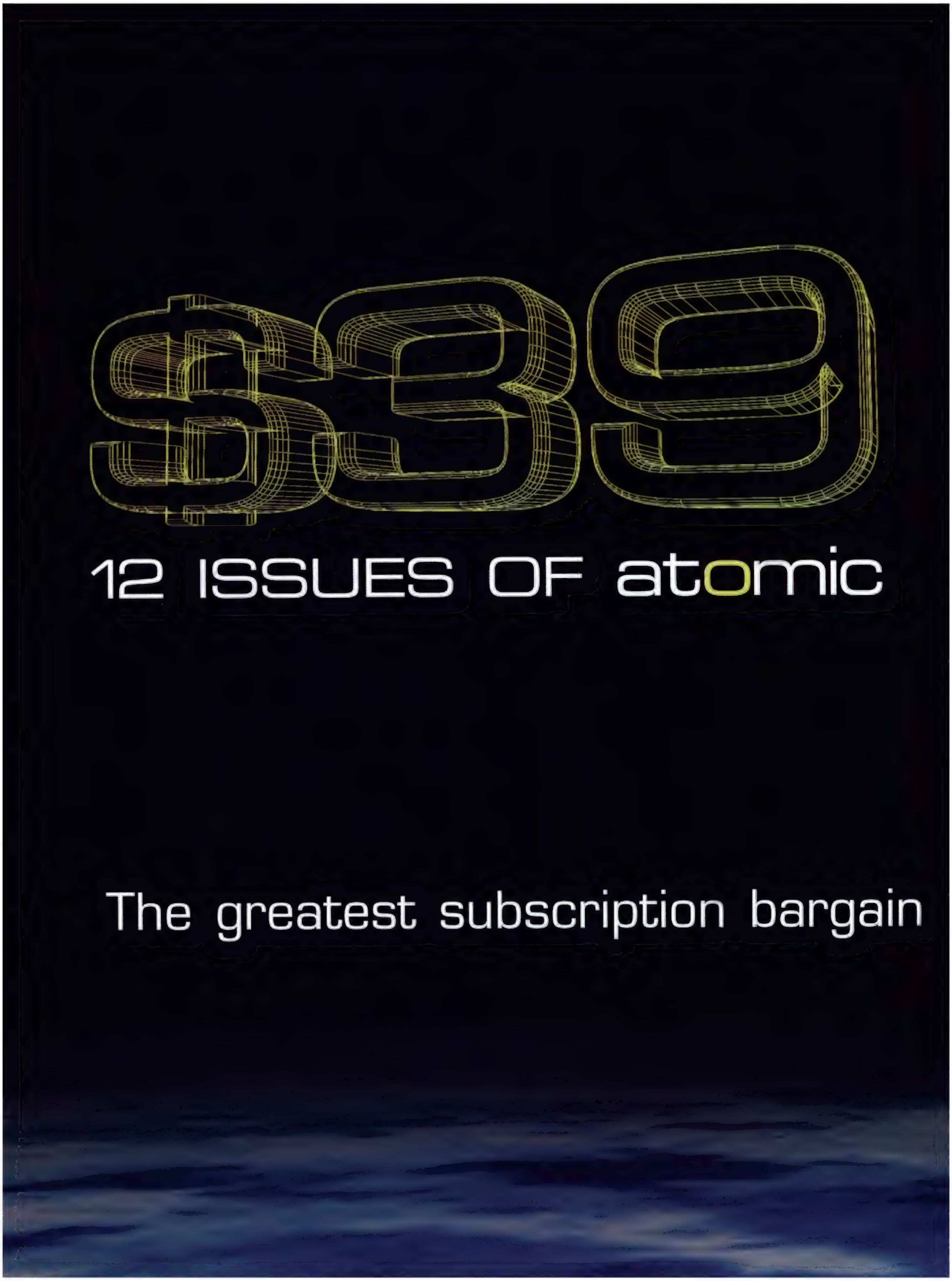

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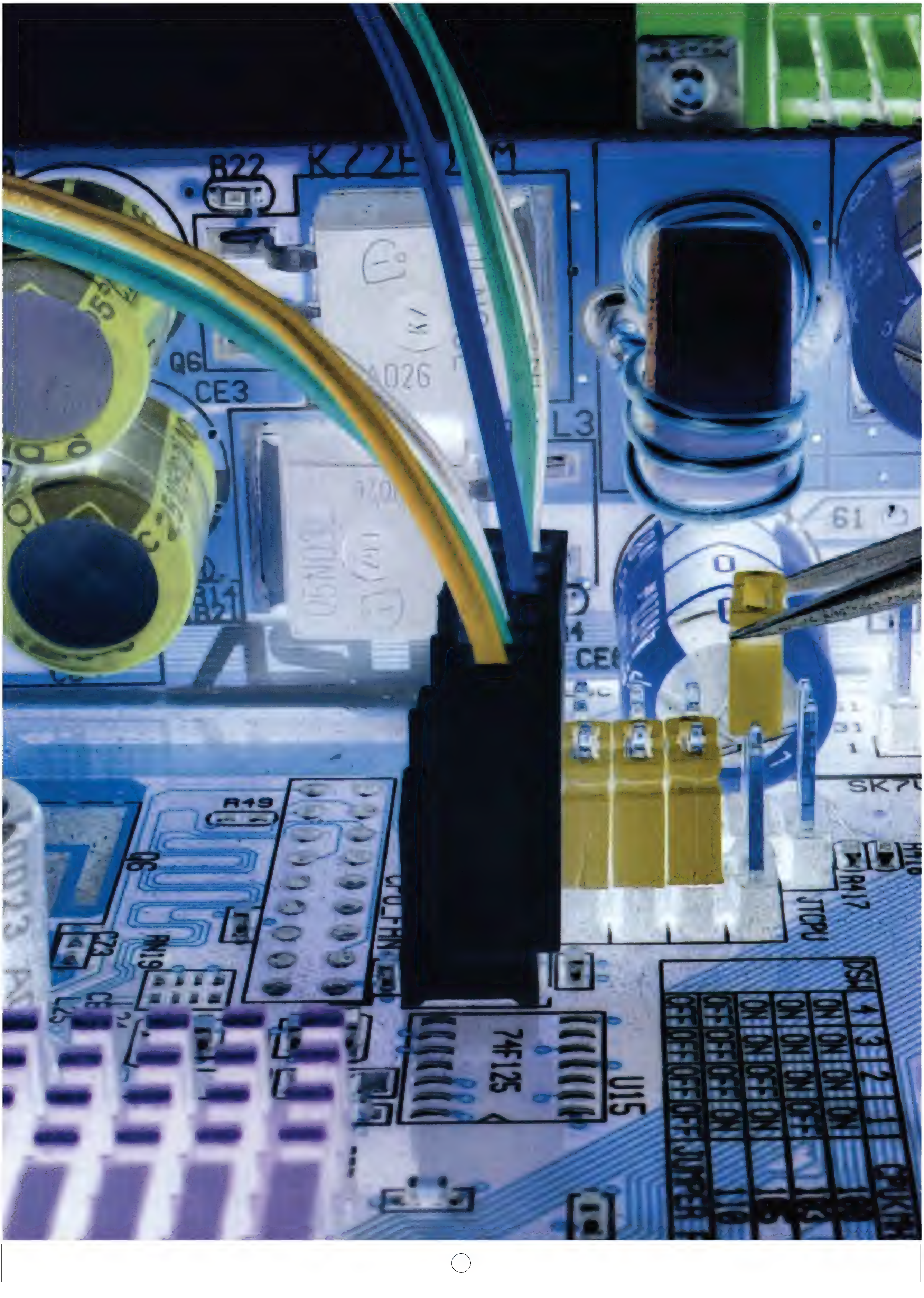
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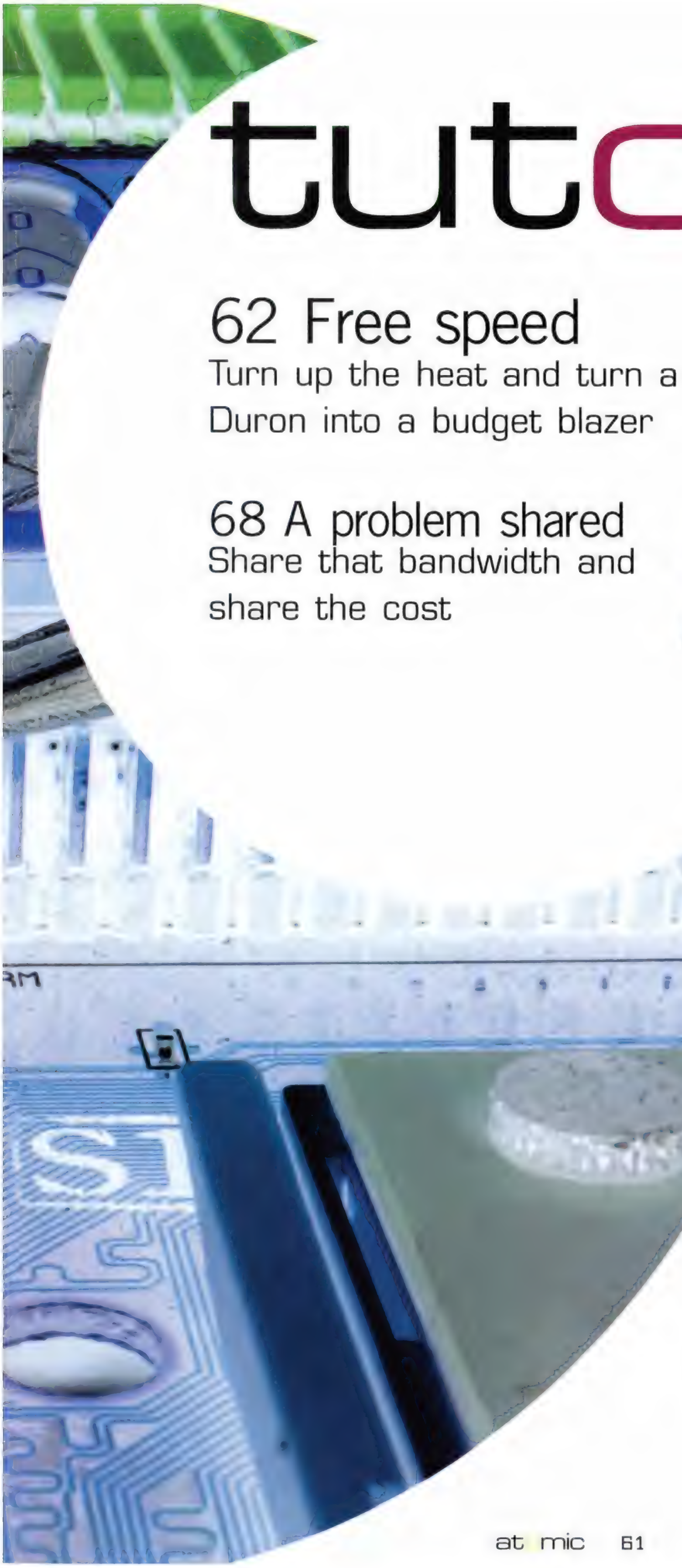

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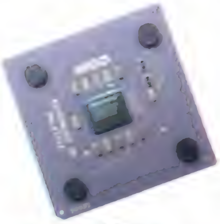


62 Free speed
Turn up the heat and turn a cheap Duron into a budget blazer

68 A problem shared
Share that bandwidth and share the cost

Disclaimer ⚠

While techniques like overclocking and modifying your hardware can give you a significant increase in performance for little cost, it still remains that there is no such thing as a free lunch. Performing any modifications to your hardware runs the risk of doing irreparable damage to it or other components in your PC and can also void your warranty. Before you do anything to your hardware or software, always be sure to read all documentation and warranty information thoroughly. Also check any other documents, such as contracts or licenses for software and services, to ensure that you do not break any agreements. atomic MPC and AJB Publishing cannot be held responsible for any damage done to your hardware or software through performing techniques outlined in this magazine. Keep yourself informed – and proceed at your own risk.

Free speed

Overclocking AMD's Socket A Duron and Athlon CPU for a cost-free performance boost

There's a new kid on the overclocking block that has kicked Intel's Celeron and Pentium III range all the way to the curb – AMD's new Socket A Duron and Thunderbird range. Due to the incredible generosity of AMD (or just a clever marketing tactic?) these already impressive chips are fully overclockable via the multiplier, making them the easiest performance CPU to overclock on the planet.

With only two settings to adjust when overclocking, these surprisingly swift CPUs really are the "Overclocking for Dummies" CPU of choice.

Follow our easy 10 step guide word by word and you'll soon be extracting the maximum power out of these impressive chips.

> "With only two settings to adjust when overclocking, these surprisingly swift CPUs really are the 'Overclocking for Dummies' CPU of choice."

Tools needed

1 x AMD K7 Socket A 200MHz FSB CPU
1 x AMD compatible Socket A mother board (THIS MUST SUPPORT CPU VCORE VOLTAGE ADJUSTMENT AND CPU MULTIPLIER ADJUSTMENT)
1 x HB pencil
1 x sharpener
1 x eraser

Cost: Less than $1 for a pencil, sharpener and eraser (not including the cost of CPU or motherboard)

Difficulty: Intermediate

step one: are you ready?

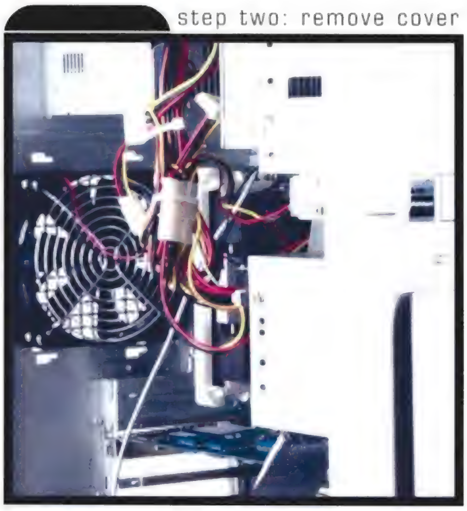
ⓘ Before you even begin removing the screws on the back of your PC case, it is essential that you know that your system is running correctly. This means absolutely no performance tweaking – simply make sure that your system is stable, so that you know any new errors after the overclock are caused by the higher speed setting. At this stage you should also:

■ Flash your motherboard BIOS to its latest version – generally newer BIOS releases are more stable and might make your system more overclockable. Select more conservative BIOS options if you know your way around the BIOS screens, as these can also aid overclocking. Check our sidebar for the URLs of the five manufacturers of multiplier adjustable motherboards.

■ Decide which benchmarks you are going to run to test your increase in speed, (or you could always benefit from our experience and use what we do, see our benchmarking article for information) and run them now so that you can be sure that they actually work on your PC. If you get an idea of how your PC performs now, it's easy to use the benchmark programs to see the exact performance increase your overclock is giving you.

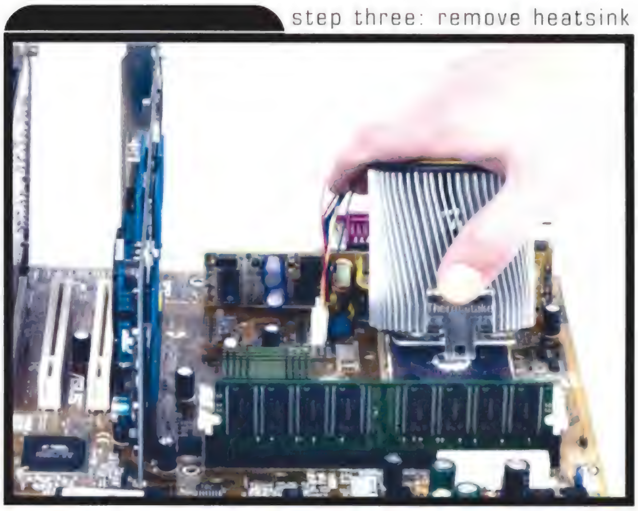
■ Install temperature monitoring software. We use Motherboard Monitor 5 (http://mbm.livewiredev.com/) due to its ease of use, comprehensive options and the fact that it doesn't cost a cent. After installing, run several benchmarks then check the CPU temperature so that you know the normal operating temperature of your CPU, which for these chips is anywhere in the range of 42C-53C.

step two: remove cover



ⓘ Most overclockers view their case covers as an easily removed barrier to getting an extra 50-100MHz out of their CPU. Take the case cover off and leave it off until you have overclocked the system and fully tested it for stability. This ensures that you have decent air circulation over your motherboard and CPU heatsink. If problems do begin to occur once the case covers are remounted, then it's simply a matter of adding some cheap case fans to get the air moving inside your case. We will be covering customised case cooling solutions in an upcoming issue of atomic.

step three: remove heatsink



ⓘ When the Durons were originally released many people tried fitting Intel-based coolers on to the Socket A mount, with the end result that many people cracked their CPU, rendering them useless. This was quickly rectified but there are now many different designs of Socket A heatsink and fan (HSF) cooler clips, so:

- Find out the correct way for removing your specific HSF combo.
- You may require significant force to remove the HSF from the latches around the CPU, but if you slightly bend the clip that holds the HSF in position after you remove it, reinstalling it and removing it in future should be much simpler.
- Check the Multiplier identification and unlocking boxout (see page 68) for the next step.

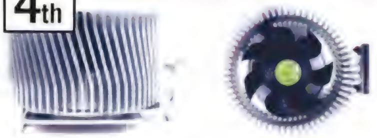
≥

Socket A compatible Heatsink Fan Roundup ≥

A cooler CPU will last longer and overclock higher, so we tried out four of the most popular Socket A HSF (heatsink/fan) combinations to find the best of the lot. All were tested on a Duron 800 running at 950MHz, after 30 minutes of 3DMark2000 (www.madonion.com) in looping demo mode. Room temperature was a chilly but constant 21C.

atomic 4th

Thermaltake Chrome Orb

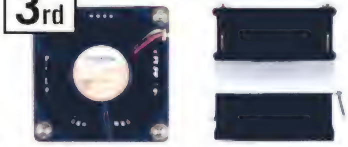


One of Thermaltake's new generation of Socket A coolers, the Chrome Orb was the easiest of all four to fit due to Thermaltake's simple clip design. Noise levels were nice and low, but its cooling performance wasn't quite up there with the rest of the pack, but for its price, the Chrome Orb performs respectably.

Price: $35
Motherboard temperature: 31C
CPU temperature: 34C

atomic 3rd

Alpha PAL6035

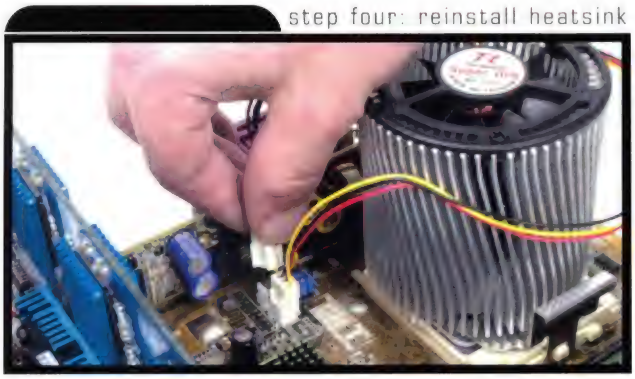


The 6035 has a reputation for being one of the best Socket A coolers around. Unfortunately our testing shows that the newer designs of Socket A coolers offer superior cooling, at half the cost. The 6035 was easily the quietest of the four tested, and installed with a minimum of effort.

Price: $80
Motherboard temperature: 31C
CPU temperature: 32C

All HSF combinations were kindly supplied by MOS Technologies www.mos net.au

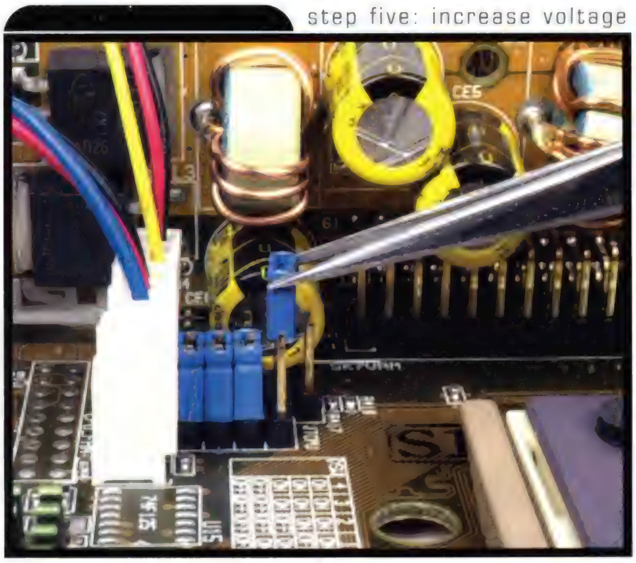
step four: reinstall heatsink



ⓘ The Thunderbird lasts around 10 seconds without cooling before spontaneously combusting, so it is essential that you:

- make sure the heatsink has been reinstalled correctly and is mounted firmly on the CPU.
- replug the heatsink's fan back into the motherboard correctly.
- power on the PC to check the fan is working ok, then shutdown.

step five: increase voltage



ⓘ Some motherboards support CPU Vcore voltage adjustments via jumpers on the motherboard, whilst others allow Vcore adjustment via the BIOS. Our reference AMD board, the A7V, supports both, so we set the jumpers to jumper-free mode and adjusted via the BIOS menu. Your motherboard manual will explain which method it uses, but YOUR MOTHERBOARD MUST SUPPORT VCORE ADJUSTING (preferably in 0.05V increments) TO OVERCLOCK SUCCESSFULLY!

- Via either the BIOS or your Vcore jumpers, increase the Vcore voltage to 1.85V. This is the maximum Vcore voltage that most motherboards will let you manually set for these CPUs, and is low enough so that you can't turn your CPU into a small puddle of molten silicon cooling at the bottom of your case. Our Duron 700 didn't boot at 1.85V, but when we lowered it to 1.8V it ran perfectly, so if the system hangs at 1.85V before you have adjusted the multiplier, lower the voltage by 0.05V and try again.

Socket A compatible Heatsink Fan Roundup

atomic 2nd

Thermaltake Super Orb

This huge HSF is rated to handle AMD 1.5GHz CPUs, even though these still don't actually exist (not in the public arena at least). With two contra-rotating fans, this behemoth moves a ton of air, but remains respectfully low in volume. Again, Thermaltake's clip design made fitting the HSF - excuse the pun - a total breeze.

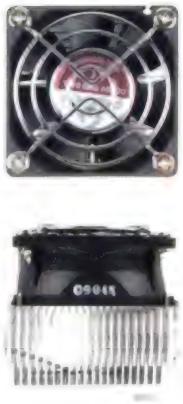
Price: $49

Motherboard temperature: 31C

CPU temperature: 29C

atomic 1st

Global WIN FOP38



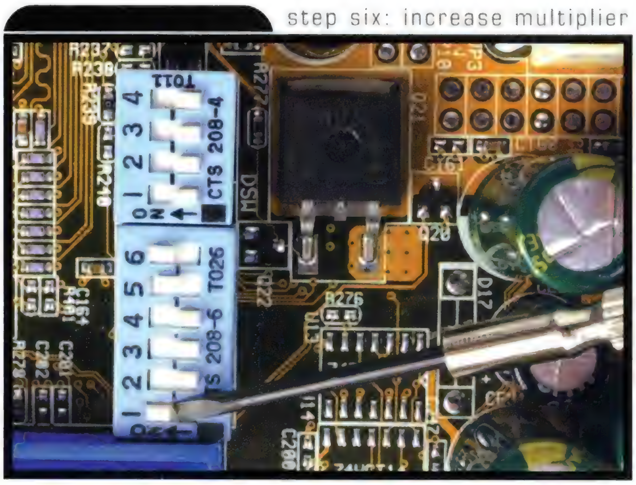
Mounting this HSF was nowhere near as simple as the other three, as it had a very stiff clip, but after a little perseverance it was installed with no damage to the CPU. We were amazed at how loud this little heatsink was, but its high powered fan removed the heat efficiently, taking our number one spot in this roundup. The amount of air blowing through it obviously helped to cool the motherboard as well, as the motherboard temperature for this HSF was a couple of degrees lower than the others. If you can handle your case sounding like a mini-vacuum cleaner, this is the cooler to get.

Price: $45

Motherboard temperature: 29C

CPU temperature: 27C

step six: increase multiplier



Determine what default multiplier your CPU has, by dividing its speed (in MHz) by 100. From this incredibly simple equation we can see that a Thunderbird 800 has a multiplier of 8, whilst a Duron 650 has a multiplier of 6.5.

- It is best to increase the multiplier in 0.5 increments. So if you are overclocking a Duron 650, with its default multiplier of 6.5, the first multiplier setting you would try is 7.0.
- Consult your motherboard manual about how to adjust the multiplier settings via the motherboard – it will either be an option within the BIOS or a dipswitch setting on the actual board itself. For the A7V we are using, there is a small set of 6 dipswitches near the IDE ports that are used for multiplier adjustments. Check the accompanying chart we have printed for the most commonly used multipliers.

step seven: boot up

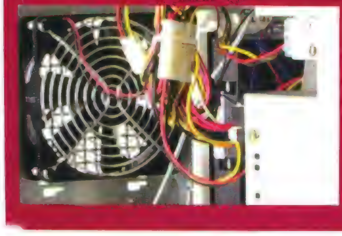
```
Windows protection error. You need to restart your computer.
System halted.
```

Turn your "ninja at minimal cost" system on.

- If the PC boots and successfully loads your operating system, you're past the hardest part of overclocking, but don't fully relax just yet.
- If, on the other hand, it locks up with weird errors ("Non system disk inserted" seems to be a favourite of a CPU that is being pushed a little too hard) before your OS has begun loading, it looks as if you're aiming a little high.
- If you are using the BIOS to adjust the multiplier, don't panic if your PC hangs even before you can get back into the BIOS. Most motherboards have an automatic BIOS reset built into them after 3 failed attempts to boot, after which all BIOS settings are reverted back to normal, including the multiplier setting. Other boards can do the same thing by holding down a certain keyboard key whilst rebooting – again you'll have to dig out that motherboard manual for this info.
- If your PC fails to boot into your operating system, then turn the multiplier back down by 0.5 and try booting from there, all the way back down to its default multiplier. Though, in all of the sub 900MHz AMD K7 chips we have overclocked, we haven't found one that didn't make it past the first 0.5 multiplier increase successfully.

≥

On the case



Many overclockers find that putting their case covers back on causes their newly overclocked CPU to start overheating. There are 2 solutions to this:

- **Install case fans, in which case you'll have to wait for our article on the best way to install case fans...**
- **Leave the case off. Whilst not the most elegant solution in the world, many overclockers never put their cases back on as it lets them squeeze an extra 50-100MHz out of their overclocked CPU. Dust isn't really a problem so long as you clean regularly with a can of compressed air (easily available at any electronics shop) but spilt bottles of Coke can be slightly harder to clean out of intricate PC hardware.**

step eight: benchmarks

ⓘ So you are now successfully in your OS of choice, running at a speed higher than you had paid for. Not bad. But not much use either if it locks up as soon as you attempt to boot up CPU intensive applications such as flight sims or first person shooters. Now it is time to fire up the mighty benchmark – an overclocker's most used piece of software other than the crucial temperature monitoring applications.

■ Run a benchmark in looping mode for as long as possible. Our overclocking tester of choice is the overclocker's workhorse; 3DMark2000, in looping demo mode with all colour and texture options at 32 bit, just to make the CPU sweat that little bit more. If you can run this for three or more hours without crashing, then you can be fairly sure that the CPU is happy at its new speed. If it runs for a full day without crashing, you can be certain that it is fine at the new speed. There's also nothing better than a few hours of hardcore gaming to put a CPU through its paces. Not that most of you will need an excuse to frag for a few hours anyway.

■ If it does crash whilst running this demo, there are two possible causes:

❶ If it crashes almost immediately after starting the demo, it's most likely that the CPU just can't handle running at such a high speed. Turn the multiplier down by 0.5 increments until you can get the demo to loop successfully. Better cooling may help in this scenario, but the odds aren't as good as if you can successfully run for a short while.

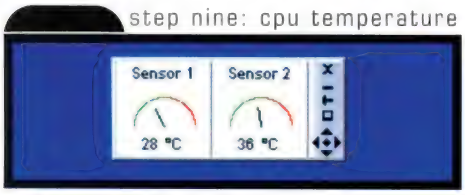
❷ If it successfully runs the demo for several minutes or more before crashing you have an overheating problem on your hands, and it's time to notch back the multiplier or look at spending a little more on a better Heatsink Fan combo. The small cost of a decent overclocker's HSF is well worth the huge increase in speed a decent setup can give you. And everyone knows how sexy some of the new custom heatsinks look.

Flash that BIOS

Get online for your motherboard BIOS update. Here are some of the more common brands:

Asus A7V www.asus.com
Abit KT7 www.abit.com
Soltek SL75KV2-X www.soltek.com.tw

step nine: cpu temperature



ⓘ Keep an eye on your CPU temperature during and after benchmarks. For these chips, temperatures around the 57C mark after a workout aren't uncommon, so don't panic when you compare them to the chilly Intel CPU in terms of temperatures. These are hot little chips, but thankfully their performance matches! With more efficient cooling solutions (see our Socket A HSF roundup on page 63 for our recommendation) temperatures between 40C to 50C are achievable. Your PC will lock up if heat is a problem, but with a CPU core voltage of 1.85V you don't need to worry about frying it (so long as that HSF is properly attached!). If your CPU temp starts going above the 60C mark it's time to start thinking more about advanced cooling solutions.

step ten: repeat step 6

Go back to step 6 and repeat

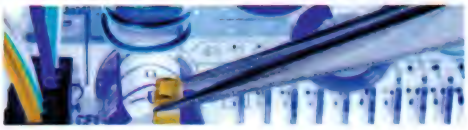
Keep repeating steps 6 through to 9, increasing your multiplier in 0.5 increments and testing along the way, until you reach the 'ceiling' of your chip. When your CPU does finally start crashing at a new multiplier, simply turn it back down by 0.5 and be happy with the blazingly fast processor you just created out of that budget priced hunk of silicon. Once you have decided which multiplier setting is best for your CPU, turn the CPU Vcore down in 0.05V increments, until it begins crashing again in benchmarks. Once it begins crashing again, turn the voltage back up in 0.05V increments to a level that is again stable. A lower CPU Vcore setting will result in a lower overall CPU running temperature, so finding what the lowest Vcore setting for your now overclocked CPU is worthwhile. We found that to get the most out of our AMD Socket A CPUs we had to use the maximum Vcore setting of 1.85V for all of them.

Now you (hopefully!) have an AMD chip running at least 20% over its rated speed. The performance increases to be gained from a few hours tweaking and a few dollars spent on a new HSF combo are well worth the minimal effort and cost. And, it's nice to know that you're getting more than what you paid for.

CPU Overclock Test Results

We tested four AMD Socket A CPUs for their overclocking abilities and rediscovered one of the OverClockers Laws – the lower the speed of a CPU for a set architecture, the more likely it is to overclock. In other words – the lower speed chips overclock better whilst the higher range chips are already running at closer to their limit and thus don't overclock quite so impressively. Our pick of the bunch for value versus performance would have to be the Duron 700, which is capable of reaching 950MHz without a blink. Such a cheap chip running at close to 1GHz with blinding performance is simply amazing.

CPU	Max attainable speed	Vcore voltage needed
Duron 700	950MHz	1.85V
Duron 800	950MHz	1.85V
Athlon 900	1050MHz	1.85V
Athlon 1GHz	1150MHz	1.85V



The Power of the Pencil

Identifying multiplier locked AMD Socket A CPU and unlocking them.

When the Duron and Athlon Socket A chips were first released, one of the most talked about features of these chips was the fact that they were multiplier unlocked. This enabled the CPU to be multiplier overclocked, a much preferred way of overclocking compared to the Front Side Bus tweaking needed to overclock Intel CPUs. Unfortunately, AMD soon started multiplier locking these CPU, and it looked like the glory days of Duron overclocking were behind us. But soon it was revealed that with merely a pencil, a small modification could be made to the chips that totally unlocked the multiplier, allowing full multiplier overclocking once again. By connecting several severed bridges on top of the CPU, the graphite within the pencil markings conducts the electricity just as if they had never been cut.

Is your Duron or Athlon multiplier locked?

The CPU must first have the heat sink fan combination removed. On top of the CPU are several golden bridges, with labels from L1 through to L7 next to certain rows. You need to identify the set of four bridges (small golden lines) that are to the right of the label "L1" (SEE DIAGRAM 01).

If you are lucky enough to have picked up a factory multiplier unlocked CPU, these four small bridges will still be joined, looking like this : (SEE DIAGRAM 02).

If, on the other hand, your CPU is multiplier locked, you will notice that the four L1 bridges have been cut by a laser, and as a result look like this: (SEE DIAGRAM 01).

If they are cut, it's time to get out that freshly sharpened HB pencil. With a steady hand, simply draw a fine line that rejoins these laser cut bridges vertically. It is important that you do not connect adjoining bridges with the pencil markings, but if you do it's simply a matter of erasing the marks and redrawing them. Don't press so hard that you scratch off the bridges, but make sure that the lines do fully connect the two disconnected parts of each bridge, so that they can once again conduct current. Here is a close up of our re-unlocked CPU: (SEE DIAGRAM 03).

If you find that you still can't overclock via the multiplier (the MHz rating on bootup will stay at your CPU default speed regardless of which multiplier setting you use), simply erase the lines and redraw them until you get it right.

This simple method of "joining the dots" is the key to unlocking that new AMD CPU of yours, as all newly produced Socket A CPU are now being shipped multiplier locked. This procedure works just as well for both Socket A Durons and Athlons.

Diagram 01

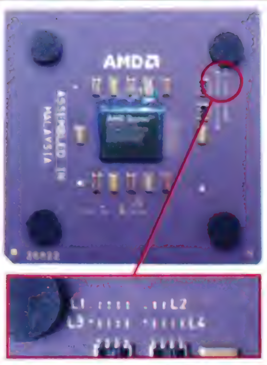


Diagram 02

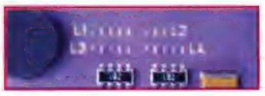
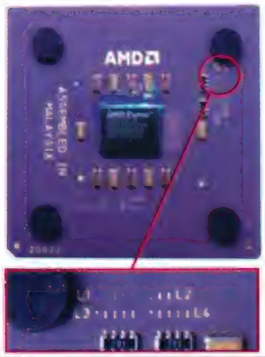


Diagram 03

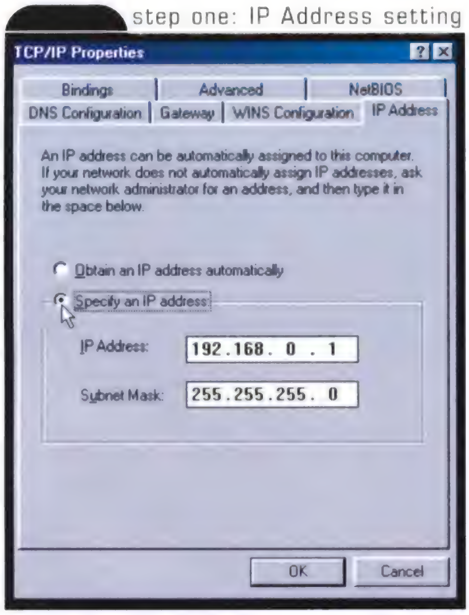


Intel users needn't get jealous, next month our "How to" article will focus on overclocking the Pentium III and Celeron range of chips. Included will be benchmark results comparing the most overclockable CPUs from both Intel and AMD.

A problem shared

Soak up that excess bandwidth by sharing it with your friends and family...

step one: IP Address setting



An IP address can be automatically assigned to this computer. If your network does not automatically assign IP addresses, ask your network administrator for an address, and then type it in the space below.

○ Obtain an IP address automatically
● Specify an IP address:

IP Address: 192.168. 0 . 1
Subnet Mask: 255.255.255. 0

> "...lead you through the basics of getting two or more PCs connected to a single cable connection..."

With a cable connection through either Telstra BigPond Advance or Optus@Home, you have more than enough bandwidth to service a few PCs browsing the net or playing online games without experiencing a significant performance hit. This guide will lead you through the basics of getting two or more PCs connected to a single cable connection using Windows 98 Second Edition or Windows ME using the built in Internet Connection Sharing (ICS) application.

First steps

The first thing you need to do is set up your LAN and have each computer connected to each other. The details of setting up a LAN at home will be covered in detail in a future tutorial, but the easiest way to do it is with a hub using TCP/IP. The PC with the cable connection will have to have two network cards installed - one connecting to the cable modem with an IP address allocated by your cable service provider, and the other connected to your hub into your LAN with its own specified IP address. Each of the PCs on the LAN needs its own specified IP address, with the server being 192.168.0.1, and each subsequent PC being 192.168.0.2 and 192.168.0.3 etc. You can specify your IP address in the Network Control Panel by going to the properties of TCP/IP. Underneath the IP Address box is the Subnet Mask - this should be the default of 255.255.255.0 for each of the PCs on the network (see step one).

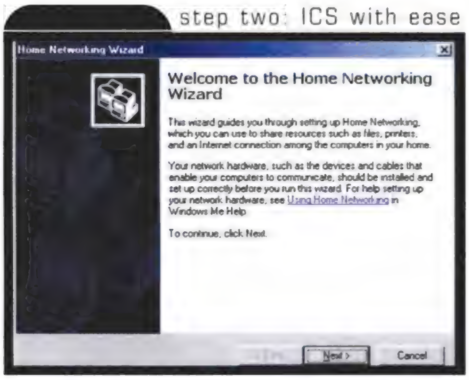
The next thing you need to do is determine your requirements for the shared connection. If you simply wish to allow multiple PCs to access the web and email over a LAN, and maybe play a few games, then things can be relatively simple to set up. If, however, you wish to open up only specific ports, or restrict usage of the Internet connection on different PCs on the network, then you will need to use a third-party proxy server application such as WinGate (www.wingate.com) or Sygate (www.sygate.com). The details of setting up a shared connection using these programs will be covered in future Tutorials.

Acceptable Use

Before you proceed, you should check your cable service provider's Acceptable Use Policy for the details of your obligations when it comes to connecting multiple PCs to the one cable connection. In general, Telstra BigPond Advance places limitations on how many users may connect to the service, and adds a fee for each additional user. The Residential and Business plans with megabyte download limits can support up to seven additional users without charge, while the unlimited download Residential plans can support up to two additional users with a fee. Optus@Home, on the other hand, allows users to connect a LAN (Local Area Network) for personal use only without any additional charges or restrictions.

Difficulty: easy

step two: ICS with ease



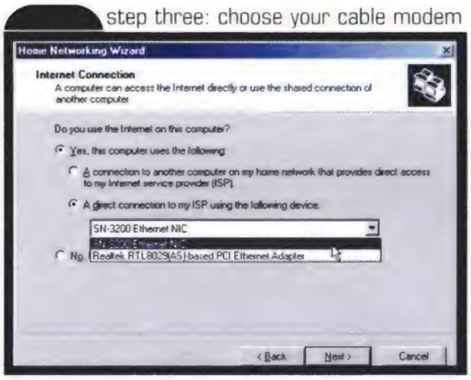
Welcome to the Home Networking Wizard

This wizard guides you through setting up Home Networking, which you can use to share resources such as files, printers, and an Internet connection among the computers in your home.

Your network hardware, such as the devices and cables that enable your computers to communicate, should be installed and set up correctly before you run this wizard. For help setting up your network hardware, see Using Home Networking in Windows Me Help.

To continue, click Next.

step three: choose your cable modem



Internet Connection

A computer can access the Internet directly or use the shared connection of another computer.

Do you use the Internet on this computer?

● Yes, this computer uses the following:

○ A connection to another computer on my home network that provides direct access to my Internet service provider (ISP).

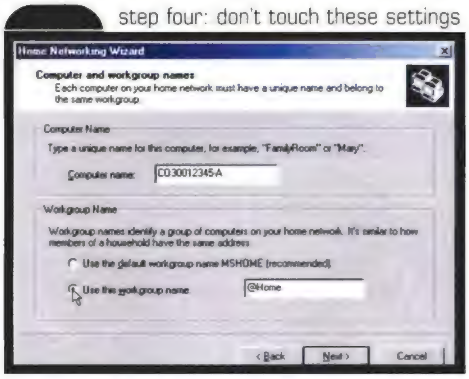
● A direct connection to my ISP using the following device:

SN-3200 Ethernet NIC

Realtek RTL8029(AS)-based PCI Ethernet Adapter

○ No

step four: don't touch these settings



Computer and workgroup names

Each computer on your home network must have a unique name and belong to the same workgroup.

Computer Name

Type a unique name for this computer, for example, "FamilyRoom" or "Mary".

Computer name: C030012345-A

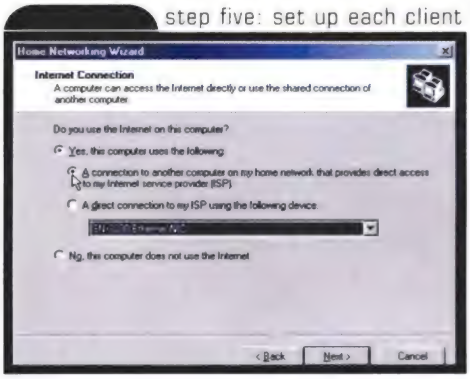
Workgroup Name

Workgroup names identify a group of computers on your home network. It's similar to how members of a household have the same address.

○ Use the default workgroup name MSHOME (recommended)

● Use this workgroup name: @Home

step five: set up each client



Internet Connection

A computer can access the Internet directly or use the shared connection of another computer.

Do you use the Internet on this computer?

● Yes, this computer uses the following:

● A connection to another computer on my home network that provides direct access to my Internet service provider (ISP).

○ A direct connection to my ISP using the following device:

○ No, this computer does not use the Internet

Internet Connection Sharing

Internet Connection Sharing (ICS) was incorporated as a standard feature of Windows 98 SE and Windows ME and can be installed from the Add/Remove Programs Control Panel in the Internet Tools section of the Windows Setup tab. When you have set up the PC with the cable connection with its second network card, you are ready to run the Home Networking Wizard, which can be found in the Communications folder in Start/Programs/Accessories (see step two). The Home Networking Wizard steps you through setting the system up as the gateway for the other PCs on your network. First off you choose which network card is connected to the cable modem, and then which one is connected to the rest of your network through the hub (see step three).

The Wizard will ask whether you want to specify your own unique computer name for the server PC, although if you are connected through a cable service provider, like Optus@Home, that requires that you have a particular computer name to identify your PC, then be sure to leave the name alone. The same applies for the workgroup name, which in the case of Optus@Home, is '@Home'. Telstra BigPond Advance doesn't have any restrictions on the name or workgroup that you specify (see step four). The Wizard will also enable you to create an installation floppy disk that will set up the connection sharing on each of the client PCs, which can be Windows 95, 98, 98 SE or ME.

Once you are finished with the Wizard it will install all the necessary settings and protocols to share your connection and you will have to reboot. You can then install the ICS software on all of the clients on your network. If the client is not Windows 98 SE or Windows ME, then you'll have to use the installer disk that is created by the server. Run the Home Networking Wizard on the clients and choose to connect to the Internet through another computer on the network - the Wizard will take care of the rest (see step five).

Once everything is set up, you should find that each of the client PCs on the network can access things like the Web through Internet Explorer and email through Outlook Express completely seamlessly. Most online games should also work, but since ICS uses Network Address Translation technology, which basically makes all PCs on the network look like just one PC to the Internet connection, there are some games that will not work. This is where it becomes necessary to use a dedicated proxy application - and we will cover those in the coming months.

The decline of 3dfx

Once great consumer 3D graphics pioneer, 3dfx, made a significant, and somewhat prophetic, announcement at Comdex 2000. With the late release, and less than startling performance of the Voodoo5 5500 graphics card, and its subsequently poor uptake, 3dfx apparently had second thoughts about its position in the industry as a developer of technology and as a graphics card manufacturer.

Die-hard proponents of 3dfx - those with particularly fond memories of the Voodoo Graphics and Voodoo2 chipsets - eagerly awaited the release of the quad-VSA-100-powered Voodoo5 6000 AGP in the hopes that it would be the one that gave the NVIDIA GeForce cards a bit of what-for. 3dfx decided to abandon its plans to manufacture the Voodoo5 6000 AGP under its own label, and licensed its Scanline Interleave (SLI) technology to Quantum3D - the well-known manufacturers of the Obsidian-range of boards. Quantum3D will be using the technology to incorporate into its 'AAlchemy family of PC-based systems for visual simulation and training applications'.

The VSA-100 chip powering the current crop of Voodoo cards. Too little, too late...

> "With rumours flying after these announcements, few people realised that the worst was yet to come for 3dfx."

Immediately after making this significant announcement, 3dfx also put out another press release stating that it would cease production of its own graphics cards, and go back to purely developing graphics chip technology.

This was seen as a huge about-face for a company that stunned the community, when, at the end of 1998, it changed its business plan considerably by purchasing the graphics card manufacturer STB, including its Juarez, Mexico, facility, with the vision of developing and manufacturing its own brand of cards. Before this purchase, 3dfx was dedicated to developing graphics chipsets, and then licensed the chips to third-party manufacturers, much like NVIDIA does today.

The reason for this change in direction could perhaps be put down to a string of unfortunate circumstances, such as the late release of the VSA-100 chip, which powers the Voodoo4 and Voodoo5-range of cards, the startling performance and industry acceptance of the NVIDIA GeForce chip and its hardware T&L support, and the luke-warm acceptance of 3dfx-evangelised FSAA (Full Scene Anti-Aliasing).

With rumours flying after these announcements, few people realised that the worst was yet to come for 3dfx. Breaths were being held awaiting 3dfx's next move. Then, on December 15 2000, from out of the blue, NVIDIA announced the purchase of 3dfx's Core Graphics Assets, deftly avoiding a raft of patent lawsuits which had been simmering for a while, supplying NVIDIA with a host of cutting edge technology, and killing 3dfx.

NVIDIA is the current industry success story, entering a market dominated by 3dfx's Voodoo and Voodoo2 chipsets with its TNT series of chips. NVIDIA proceeded to chip away at this, then unassailable, lead of the graphics chipset market, with its GeForce256 and GeForce2 GPUs (Graphics Processing Units).

The aquisition enables NVIDIA to utilise previously unavailable graphics technologies such as 3dfx's GigaPixel and T-Buffer. It remains to be seen where these will emerge. With the NV20 chipset due for release early this year, will NVIDIA incorporate 3dfx's technology or will we have to wait for the next generation?

www.3dfx.com

Many would argue that the lateness and eventual sell-off of the Voodoo5 6000 was the death knell for 3dfx.

PC133? PC800? PC2100? PC Guff!

There seems to be a lot of confusion around at the moment as to what is actually meant by the 'PC' rating of different types of RAM. Originally RAM generally only came in one speed for a particular type, although with the introduction of processors and chipsets that could support multiple bus and memory speeds, such as with the Pentium II and the Intel BX chipset, it became necessary to differentiate between the different speeds of RAM. It was quite simple - PC100 SDRAM ran at a frequency of 100MHz, and then came PC133, which funnily enough ran at 133MHz. Then along came RDRAM, which runs at much higher frequencies than SDRAM, and is also 'double pumped', which brings new confusion into the game. PC600 RDRAM actually runs at 266MHz; PC700 RDRAM runs at 356MHz; and PC800 RDRAM runs at 400MHz. Now the 'PC' doesn't necessarily represent the actual frequency of the RAM, but some abstract figure representing its effective speed. Now we have DDR SDRAM, and the picture just gets worse. PC1600 SDRAM doesn't run at 1,600MHz, and even though it is DDR, this doesn't even mean it runs at 800MHz - no, now a conglomeration of RAM manufacturers, going by the name of TeamDDR, has changed the rules again and the 'PC' doesn't represent the frequency at all, but now stands for bandwidth. PC1600 SDRAM runs at 100MHz DDR (equivalent to 200MHz), and has a maximum bandwidth of 1,600Mb/sec, or 1.6Gb/sec, and PC2100 SDRAM runs at 133MHz (equivalent to 266MHz) and has a bandwidth of 2,100Mb/sec, or 2.1Gb/sec. All this is reminiscent of the days when Cyrix invented its 'P' rating, and named its chips by how it thought they would compare to equivalent Intel chips, like the 133MHz 6x86 was called a PR166+. Will the inanity ever cease?

ⓘ How fast is a stick of RDRAM? Guess again pal!

NV20 - packing the good stuff?

With any luck, by the time you read this we should have at least one card featuring the new NV20 chipset from NVIDIA sitting in our testbench and copping a hiding from our benchmark suite - so what can we expect from this latest generation of graphics chips from the current performance leader, NVIDIA? Claims are that it will be up to several times faster than the GeForce2 Ultra, although this is based on raw performance figures. One very interesting feature is the inclusion of HSR (Hidden Surface Removable) features, which like the HyperZ technology in ATI's Radeon, is intended to optimise memory usage by not rendering surfaces that are not visible to the player. This move alone could have a significant impact on performance, especially at high resolutions. The geometry throughput also gets a boost, with improvements to the T&L engine, and the core itself is slated to be able to perform one trillion floating point operations per second. There should also be an increase in image quality features with a improvements in FSAA (Full Scene Anti-Aliasing) implementation and other texture filtering techniques. Sounds good so far? Stay tuned to the atomic Labs.

Short Circuits

NVIDIA's product release schedule

The original GeForce256 GPU firmly fixed NVIDIA's position as the leading designer of graphics chipsets. NVIDIA's hottest new card wasn't that hot for long though. Within six months it had released its successor, the GeForce2, with yet another leap in performance. Fast forward another six months and the final iteration of the GeForce series has arrived. Astute readers will notice this is pretty much the same cycle of releases as previous NVIDIA products, beginning with the RIVA128 through to the TNT-series of video cards. So going by this 18 month cycle we can predict that the NV20 chipset should be out towards the end of our summer, which is around the date being mentioned by NVIDIA. Which begs us to ask the question - is it worthwhile buying the expensive Ultra when its successor is so close to release? Well, if you are in need of some serious gaming power, and you have the money to spare, there can be no doubt that the Ultra is sure to please, although if you can wait another couple of months, the NV20 could usurp the Ultra for a similar cost.

www.nvidia.com

Short Circuits

Mustang off the roadmap

In an interesting move, AMD has dropped one of its future processors, codenamed Mustang, from its roadmap. The Mustang was to be one of three new processors based on the Athlon core, and was to feature an increased cache size, much like the Intel Pentium II and Pentium III Xeon, perhaps even up to 2Mb in size. This CPU was to be targeted at the workstation and server market, with a vision to running in pairs on AMD's new 760MP multi-processor enabled chipset. AMD's two other Athlon-derivatives, codenamed Palomino and Morgan, still have the go-ahead, with the Palomino taking the Mustang's place in the high-end markets, at least until the 64-bit Hammer-range of processors are released.

While AMD seems reluctant to release any details on its new processors at the moment, it appears as though the most significant changes in the Palomino and Morgan are their dramatically reduced power consumption. The benefit of lower power is lower heat, which in turn allows the processor to reach higher frequencies. There is also talk of an improved branch prediction unit, although other details are hard to come by at the moment. We can expect the Palomino and Morgan sometime in Q3 2001.

www.amd.com

z-access written by Tim Dean.

Legacy of the i850

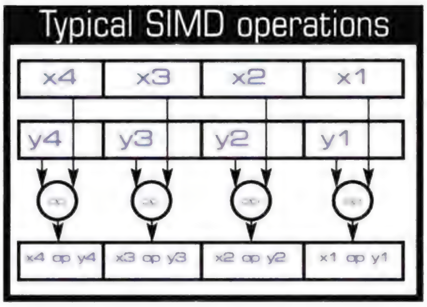
[illegible] much talk online about the 3dfx Voodoo5 5500 not fitting into the AGP slot on an Intel i850-based motherboard, although this problem is not just limited to the Voodoo5 5500. There are several different standards and versions of AGP, and AGP cards can either operate at a 3.3 volt or 1.5 volt differential. Cards that support the 1.5 volt standard have an extra notch in the AGP connector. Motherboards that feature a universal AGP slot are capable of connecting to either types of cards, whether they have an extra notch or not. Since the i850 chipset is primarily intended for use with AGP4X graphics cards, and coupled with the fact that the vast majority of graphics cards are either running on AGP4X, or at least on the 1.5 volt standard, the i850 only has a 1.5 volt AGP connector. As such, any graphics cards that utilises only the 3.3 volt connector, including the Voodoo5 5500, will not fit into an i850-based motherboard without a universal AGP slot. With the Pentium 4 requiring a new motherboard, RDRAM, new case and PSU, and now not being compatible with older graphics cards, it is even further from being a viable upgrade alternative.

Got an i850 board? Forget about a Voodoo5 5500.

Can you SSE the difference?

[illegible] MMX, then 3DNow!, then SSE and now SSE2 - so what is the big deal, and do any of these technologies make any difference? These three technologies represent special instruction sets that have been added to the IA-32 architecture in an effort in increase performance in specific areas of applications. They all work on the principle of Single Instruction Multiple Data, and can potentially execute several operations simultaneously with the same instruction. Essentially, the special instruction registers can load several packed data elements and run them in parallel using a single operation. This is especially useful when it comes to very repetitive operations like if you are performing a blur in Photoshop or calculating the geometry in a 3D scene. If you look at the benchmark results from this month's head-to-head between the Pentium 4 and Athlon, you can see that the special Intel-optimised applications experience a boost in performance on the Pentium 4. This begs the question: how much software will be properly optimised for SSE2? History tells us that the real-world impact of extended instruction sets is limited due to poor implementation in software, although the potential for significant improvements in performance are definitely there. Let's hope the software developers make the effort and utilise the power of these instructions to their maximum potential.

Typical SIMD operations



Why buy it when you can win it?

Here is your chance to pick up a pile of free stuff specially selected from what impressed us this month.

But of course we want you to work for it; it amuses us. Our trivia bot has been working hard in the labs coming up with these questions. So get cracking, answer the questions and score some free booty. Separate entries for each competition please.

Competition 01

Yamaha CRW2100EVK

This is the CD burner we loved so much that we gave it a Hot award in our review on page 42. The great folks at Yamaha have given us one of these fantastic drives to give to a lucky reader. Worth $749

Q In what year did Yamaha last win the world 500cc motorcycle manufacturers championship?

Competition 02

Sacrifice

Early contender for the game of 2001, this psychedelic twist on the RTS genre has had jaws dropping around the atomic offices. Check out our in depth review on page 83. Thanks to Interplay we have 10 copies of this Hot title to give away. Worth $89.95 each

Q Another name for a Sacrificial Lamb is a Scapegoat. What exactly is a Scapegoat named after?

Competition 03

B-17 The Mighty Eighth

The last great MicroProse flight sim has landed. Giving you the chance to take control of a whole squadron of bombers, this game gets the atomic treatment on page 88. Hasbro Interactive has kindly supplied us with 10 copies to give away. Worth $89.95 each

Q Which crooner starred as a B-17 crewmember in the film *Memphis Belle*?

Competition 04

Logitech iFeel Mouse

It is optical, has a soothing red glow, has an Inertial Harmonic Drive and is reviewed on page 43. Logitech has given us 4 of these to give away. Worth $99.95 each

Q What was Logitech's first force feedback 3D game controller called?

Send you entries with your name, address, name of the competition and answer to the question on the back of an envelope to:

[Competition Name], atomic, PO BOX 275, Beaconsfield, NSW 2014

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games

83 Sacrifice
Shiny Entertainment delivers a surreal and stunning RTS game.
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88 B17: The Mighty Eighth

The games that are covered in atomic are not for children. In fact they are not really games. We prefer to think of them as semi-educational, mentally-stimulating, reaction-enhancing simulations of real and unreal events, that just happen to be incredibly enjoyable.

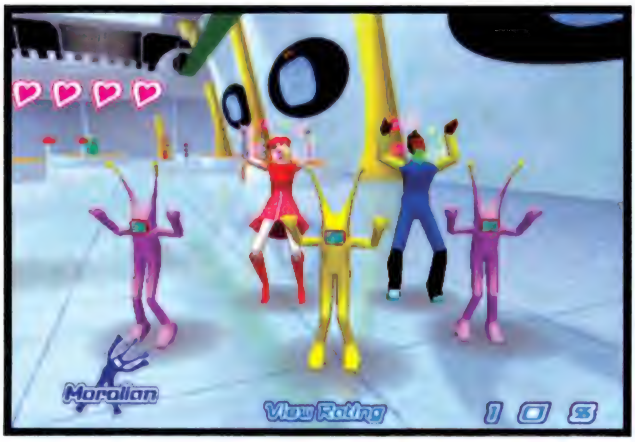
We don't cover each and every title that is released to the frenzied masses, instead preferring to focus our atomic attention on the select few titles that we believe are worthy of both your, and our, time. Occasionally there will be an incredibly over-hyped title that needs to be put back in its place, and we'll be the ones to do it. And you can be sure our reviewers actually play the final versions of games for a lot longer than the hour most other reviewers seem to put in to their games reviews. If the game has a heavy multi-player element, you can be assured we haven't just run around on our own, jumping a bit and gazing at crates for a little while.

We stand for Maximum Power Computing, and as such realise that the next generation of consoles such as the Dreamcast and PlayStation 2 are worthy of being included under this moniker. ■

dc ps2 pc

Space Channel 5

The disco diva Kevin Cheung shakes his booty with Space Channel 5



The Teletubbies do their thang while the Spice Girls try and keep up in the back.

This one is an interpretive piece about the perils of ladder climbing.

The year is 2499, and skin-tight lycra is back in style. Ulala is the hip and happening news anchor for Space Channel 5, reporting live from a space station just as it's invaded by a race of aliens that resemble distant cousins of the Teletubbies. Ulala takes 'intrepid news reporting' a step further than Lois Lane and April O'Neill, packing her thigh-holstered ray gun and embarking upon a daring rescue of the poor sods who've been kidnapped. But aliens aren't the only things Ulala has to fear. Show hosts from competing space channels are racing for the exclusives, trying to get the scoop on her.

Don't go running away just yet, folks, this isn't some bizarre Japanese role-playing geekfest. This is a bizarre Japanese music and dance game. Ulala struts, swivels, and grinds her hips in time with the music as instructions are given to press various buttons. "Up, down, up, down, shoot, shoot, shoot" - it's your job to make sure Ulala follows suit.

Following these instructions is simplicity itself. It's all done to the beat of the music, so it's just a question of getting into a good rhythm and grooving along with the music. The music starts with up-tempo disco and leads into some big beats and electronica for variety, but without marring the consistency of the style and themes.

The only thing players have to keep their eyes on is whether they're shooting at aliens or humans. The A button vapourises aliens; the B button teleports humans to safety.

Anyone rescued by Ulala becomes part of her troupe, marching to the beat like an ensemble of Michael Jackson's Thriller zombies. Speaking of whom, the 20th Century's King of Pop makes a very special appearance as Space Michael (he's even credited at the end!). Rescue him and your gang will be, clicking your fingers and dancing in a way that, well, only Michael can dance.

Space Channel 5 is by no means a great technical achievement for videogames generally, but it's the perfect party game to play through the night with a bunch of drunken friends. That's far greater value than most other games can wish for. ▢

Here kitty, kitty, kitty!

atomic
7/10

game details

✓ The rhythm and style is guaranteed to draw crowds. Even though it's single player, it's still a very social game.

☒ Limited interactivity – becomes monotonous after a few consecutive goes.

Minimum Requirements: Dreamcast, control pad.
Recommended: As above, plus VM Unit

Developer: Sega www.sega.co.jp
Distributor: Ozisoft (02) 8303 6800

atomic tools

Here's your chance to own your own piece of atomic equipment. All products have been carefully vetted by the atomic team and have been given honourary HOT awards. When pulling apart The CLAW the atomic tool kit was the only one that made the grade; when working out what goes on inside the P4, we turned to the Illuminator for enlightenment; when storing our recently backed up CDs we turn to the Stash Master; and when keeping our glory box of issue 01 copies they go in the atomic stock pile. So get to it, join the merry band of atomic brand merchandise, and then everyone will fear your l337 skillz.

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No One Lives Forever

atomic HOT

John Gillooly puts on his best floral dress and goes undercover.

Forget hordes of rampaging henchmen, perhaps the biggest danger are evil Beatniks.

Everyone knows the best superspies dress only in tye-dyed clothing.

Agents of the British secret agency UNITY are being systematically eliminated, and it falls upon Cate Archer, ex cat burglar and superspy in waiting, to solve this mystery. The subsequent odyssey begins in the streets of Marrakesh and progresses through every conceivable spy movie location: mysterious tropical island, sunken cargo ship, hijacked airliner, secluded alpine chateaux, Cold War Berlin and even secret space station.

With a distinct 60's theme, NOLF is an absolute joy to play. Gameplay is linear, but this does not become distracting. The game features an incredibly strong storyline, dripping with cliché and driven through scripted debriefings and encounters punctuated with genuinely funny dialogue. This is tied with intelligent level design, a horde of gadgets and weapons, vivid characterisation and heart pounding action to provide an unforgettable game.

Just over two years ago Half-Life raised the bar for the single player FPS experience and built expectations of a new age of intelligent, engrossing solo gameplay. Unfortunately this became swamped by the push for multiplay experience made by companies like id Software, Epic and even Half-Life creators, Valve Software. NOLF takes this next belated leap in providing quality single play.

This is not to say multiplay in neglected, with standard deathmatch and a "capture the intelligence" mode, a spin off of the standard capture the flag with the objective being to photograph intelligence items rather than pinch a large stick with some cloth on it.

NOLF is the first game released using the now widely licensed Lithtech 2.5 engine. Previous Lithtech games have been somewhat disappointing, with a cult following but none of the wide-ranging appeal that rivals id Software and Epic have enjoyed with their games. It is at once a quality game in its own right and a technology showpiece, demonstrating the enormous flexibility of the engine, especially for large outdoor levels. This is exemplified by the use of innovative gameplay such as driveable motorcycles and snowmobiles, as well as scuba diving and skydiving.

NOLF is a breath of fresh air to the disappointing genre that single player first person shooters have become of late. Everyone has secretly fantasised about being in a spy movie and this, folks, is the closest you will get.

atomic
9/10

game details

✓ **Strong storyline, innovative weaponry and gadgets, Minimal jumping puzzles, Bright clothing.**

✗ **Strong linearity, A handful of poorly implemented "sneaking" levels.**

Minimum Requirements: PII 300MHz, 64Mb RAM, 400Mb hard drive space, 8 Mb 3D accelerator card, DirectX 7.0 or higher.
Recommended: 600MHz CPU, GeForce 256 or better, 128Mb RAM, 900Mb hard drive space.
Sound APIs: Direct Sound
Video APIs: Direct3D
Multiplayer: Dedicated Server option, TCP/IP.

Developer: Monolith www.lith.com
Distributor: EA www.ea.com

Mechwarrior 4 Vengeance

George Soropos straps himself into the latest in mech wear

Big walking tank games, for want of a better description, have been with us for a while now and are essentially still the same as when Activision rolled out the first Mechwarrior title sometime during the Napoleonic wars. Whilst they haven't deviated significantly from their origins, Mechwarrior 4 (MW4) is the latest shining example of the fun that stompy combat can be.

If you're expecting a dynamic and ever changing campaign, you may not appreciate the heavily linear style of the MW4 campaign. If you can get past the fact that most missions are fixed, you will soon realise that the 30 missions help to shape a solid storyline in ways impossible for current dynamic campaign games.

There are a huge variety of mechs to be driven in MW4, with the required ED-209 lookalikes alongside gargantuous versions of Metal Mickey. You will find the larger mechs to be of the most use, but the faster scout mechs also have their place within certain situations.

Graphics to die for

MW4 must be commended for its amazing graphics, which whilst having a few shortcomings such as sprite based trees and civilians, it nevertheless leaves the jaw gaping and the immersion levels rising. Cockpit detail isn't as impressive, but you'll most likely be straining your eyes scanning the horizon rather than staring at your instruments.

Controlling your lancemates hasn't been the easiest of tasks in the past, with their behaviour often suggesting they've had one too many pre-mission cocktails. Thankfully MW4's pilots generally do the tasks they are assigned to, although the occasional lost team mate still occurs. Enemy AI must be commended, at last the old tactic of getting up close and personal before unloading with six barrels of lovin' will no longer work every time.

ⓘ Don't get too close to exploding mechs - or you risk losing your legs.

Multiplayer modes include deathmatch and team deathmatch, as well as the more interesting CTF, king of the hill and steal the beacon (high speed tag in mechs equals good fun!).

MW4 does come across as slightly more arcadey than the previous Mechwarrior games, but its blend of furious action, mammoth firepower and mind-blowing graphics helps to make it one of the most immersive mech sims available. ▢

ⓘ Point that thing someplace else.

game details

✓ **Immersive gameplay, amazing graphics, huge variety of mechs and weapons.**

✗ **Simplistic mission structure, occasional suspect lancemate AI.**

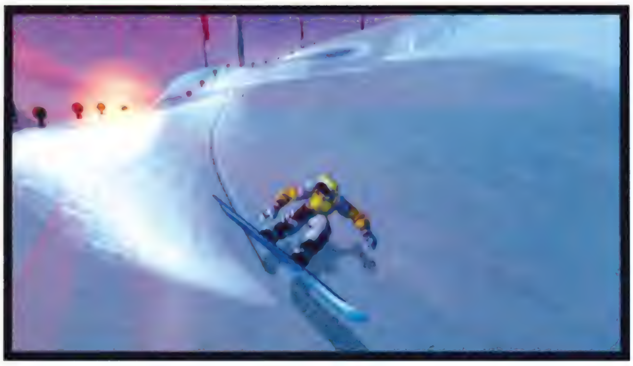
Minimum Requirements: PII/300MHz, 8Mb Direct3D compatible video card, 64Mb RAM, Min HDD 650Mb
Recommended: Celeron/650MHz or PIII/600MHz, 32Mb Direct3D compatible video card, 128Mb RAM
Sound APIs: DirectSound, EAX and EAX2
Video APIs: Direct3D

Developer: FASA Corporation www.fasa.com
Distributor: Microsoft www.microsoft.com/games

atomic
8/10

SSX

There's snow business like snow business, sings George Soropos



ⓘ Girl Bond tries to get away from the atomic explosion behind!

SSX was made in Canada by a local development team, given to EA Sports as part of a reparations package intended to compensate the US for harbouring William Shatner and Bryan Adams all these years. Canada initially offered the South Park crew as well, but the Americans rightly assumed that this was just another sneaky attempt by the Canuks to subvert their moral fibre, thereby, seeing as how it's the only kind of fibre most Americans have, condemning them to a slow death by bowel cancer.

As you'd expect from people living in the snowiest country on Earth, these guys know their snowboarding and have managed an excellent trick with SSX, finding the perfect compromise between huge-air arcade physics and realistic motion on the snow itself. Their other great feat was to provide the gamer with an almost perfect balance between going for tricks and position in the races, where most other snowboarding titles have either gone one way or the other.

SSX does this through its 'adrenaline boost' control, which acts like a turbo charger, allowing the player to land some big tricks and then catch up to the field quite quickly. In fact, you charge up the adrenaline boost by landing those big jumps so the two things go hand in hand.

> "...perfect compromise between huge-air arcade physics and realistic motion..."

Freestyler

There are eight courses in the game and while the first two are essentially training grounds the other six are some of the best in any boarding title, and allow plenty of scope for exploration as well as fun. In fact it's quite important to have a look around the courses, as you may need the shortcuts you find to help you win, unless you're a bit of a legend you're going to need every shortcut you can get.

ⓘ Can I borrow your helmet fella? I seem to have lost mine.

Winning is quite a challenge in SSX, as it should be. This game requires a bit of commitment from the player, it certainly isn't something you can pick up and master straight away. Just as in real life to become good enough to challenge the best of your opponents you'll need to practice fast turns on the snow, doing tricks efficiently without wasting too much time hanging around and most importantly, bumping other players out of the way. Yes, there's a bit of 'Road Rash' style action here as well and if you play too nice you aren't going to win.

SSXY

The PlayStation2's graphics capabilities are shown off to full effect in SSX, and as well as being one of the best release titles to play it is also one of the prettiest. The game maintains an almost constant 60 fps, only slowing down when ALL the other boarders are on screen, and the sensation of speed is fantastic.

Snowboarders have a long wait for the Cricket season to end, the footy season to begin and the snow to start falling, unless they own a PS2.

game details

✓ **One of the best of the first crop of PS2 games, awesome sensation of speed and a challenge to play.**

☒ **Not much replay value once beaten.**

Minimum Requirements: PS2

Developer: EA Sports http://easports.ea.com/
Distributor: EA http://www.ea.com/

atomic
8.5/10

Microsoft Combat Flight Simulator 2 - WWII Pacific Theater

Bennett Ring takes to the skies in Microsoft's latest and greatest flight sim

Many people expect a World War 2 flight sim to be a simple affair, when compared to the complexity of a modern jet fighter sim. MCFS2 (Microsoft Combat Flight Sim 2) shatters this notion with its intricate and deadly flight model, flown through epic aerial battles where the odds of surviving are low.

Microsoft have 18 years experience making flight sims, yet it has only been recently that they have started to strap things that go boom to their virtual planes. With the release of MCFS2, Microsoft have proven they have finally figured out the ingredients for a thoroughly enjoyable combat flight simulator.

Historical accuracy

Those hoping for a Dynamic Campaign might be initially disappointed with the semi-linear branching campaign, but will soon come to appreciate how the game stays true to historical battles. Multiplayer support is also included, but unfortunately it seems as if the network code could use some work, and the much desired co-operative play has been sadly omitted. There is also a thorough range of training missions and instant action missions, as well as a comprehensive mission builder.

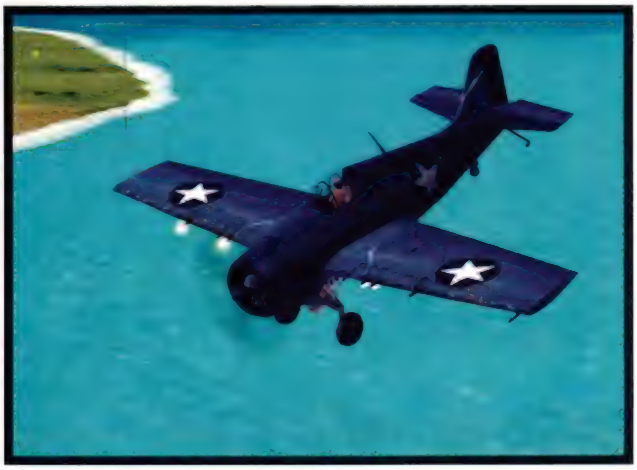
game details

✓ **Amazing graphics, intricate flight model, impressive damage modelling, carrier take-offs and controlled crashes (landings!).**

✗ **Poor multiplayer network code and no co-operative missions, steep learning curve, ships can be sunk by cannon strafing.**

Minimum Requirements: 266MHz CPU, 32Mb RAM, 4X CD-ROM, SVGA video card or 3D graphics accelerator with 4Mb RAM for advanced graphics features, DX7.0 compatible soundcard
Recommended: 700MHz CPU, 32Mb GeForce, 128Mb RAM
Sound APIs: DirectSound
Video APIs: Direct3D with hardware T&L support

Developer: Microsoft www.microsoft.com
Distributor: Microsoft www.microsoft.com



ⓘ Making strafing runs with the gear down is generally a bad idea in MCFS2

You will not believe the amazing graphics on offer that hint at how close we are to photorealistic visuals. Wave after wave of intricately detailed (and intelligent!) bandits will fill the HUD of your chosen fighter, running at a surprising pace considering the amazing detail. The damage effects are amazing, with an example being the six different types of smoke that indicate varying degrees of damage. Flying into a storm of flak bursts and tracer fire over an enemy carrier group is a sight that has to be seen to be believed.

These visuals would be worthless if they were backed up by arcade-like handling, but those 18 years of experience really shine through in the flight model. On 100% difficulty, these planes are definitely a handful. I can't remember the number of times I've stalled and pancaked after a slow takeoff from my carrier. And I won't even mention how often I slam into the rear of a carrier when landing. Spins, stalls, high-speed compression and structural failure are all modelled brilliantly. No doubt the input of several surviving WWII aces has helped shape the feel of these planes. Luckily for the newbies, the flight model is extremely configurable, and the excellent wingman AI will be of help in completing the difficult mission objectives.

If the thought of realistic WWII Pacific dogfights rendered with a jaw dropping graphics engine appeals to you, do yourself a favour and buckle up in the virtual cockpits of MCFS2. ○

atomic
8.5/10

ADVERTISING

Sacrifice

Shiny come up with a game Justin Kranzl would sell his soul for.

Shiny are a company whose games never just pop up out of the blue. There are not too many avid gamers who would not have been aware of the development of their latest gaming opus, Sacrifice, for instance. This kind of constant visibility is a two edged sword. Messiah, for example, met with a mixed reaction, as the actual product didn't match the hype. The good news is that Sacrifice is no Messiah; in fact, it's not an exaggeration to say that Sacrifice has to be an early front-runner for the most innovative and graphically accomplished Real Time Strategy (RTS), if not PC title, of 2001.

At its root level, Sacrifice is an RTS. This is only the tip of the iceberg, however. Shiny have managed to approach the RTS genre at such an angle that Sacrifice is unlike any RTS you have played. Imagine Myth mixed with Starcraft and a dash of FAKK2 and you may get close to a rough idea of what kind of concoction Dave Perry and his merry men have cooked up.

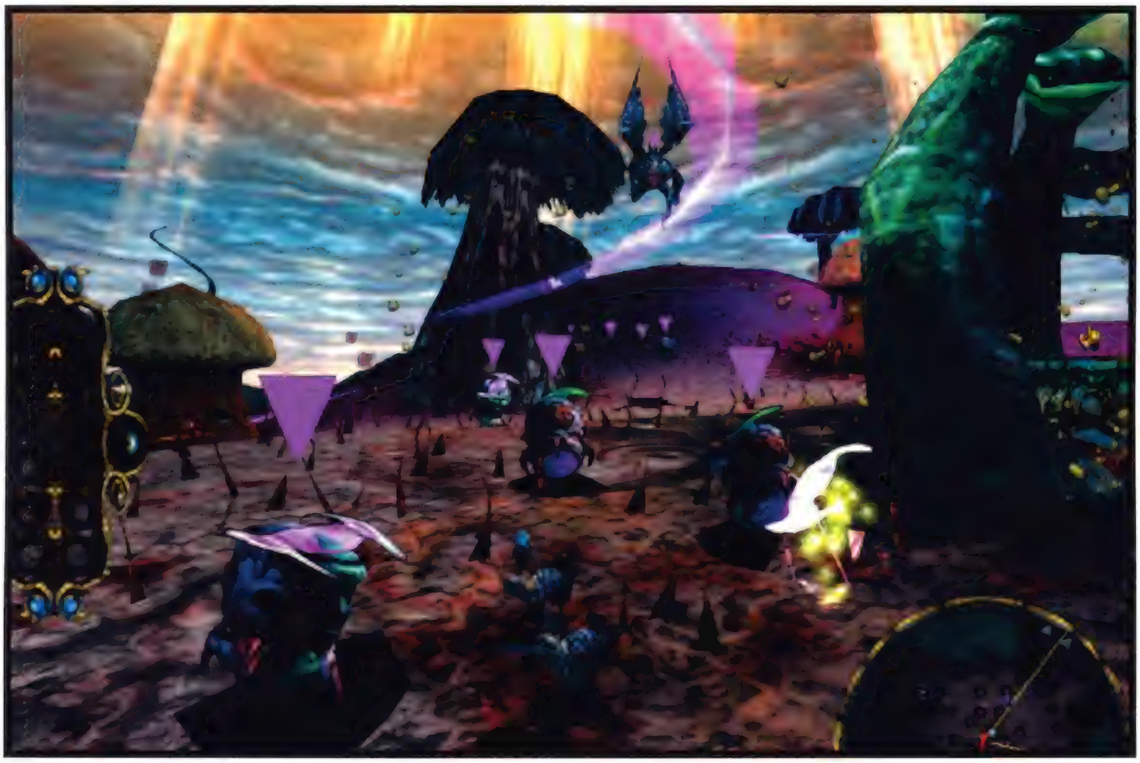
Sacrifice does require some time to be spent getting acclimatised, and it will not be long before you come to the HAND conclusion – Hotkeys Are Needed Definitely. Whilst superbly dexterous gamers would hypothetically be able to complete Sacrifice without binding spells to hotkeys, the rest of us need to create shortcuts wherever possible, made easy by Shiny's menu system.

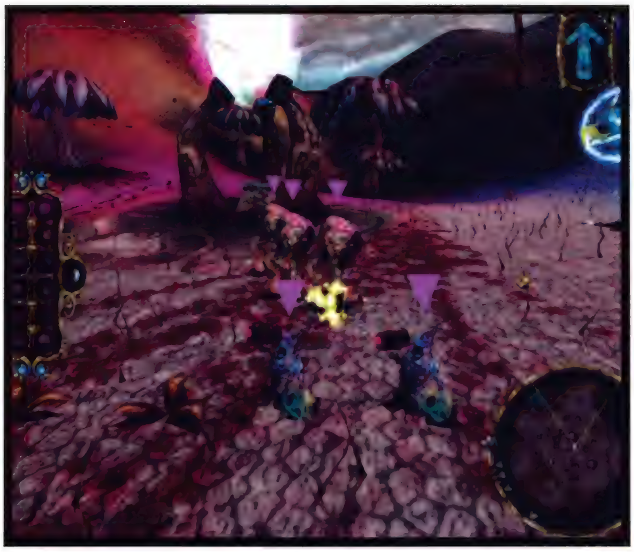
The plot unfolds in single player campaign mode with the aid of imaginative and well-acted voice commentary and cutscenes to guide you on your way. The level of professionalism achieved in this manner of storytelling is not to be underestimated – this approach adds character and personality to the storyline, which in turn is dictated by your own performance as the game progresses.

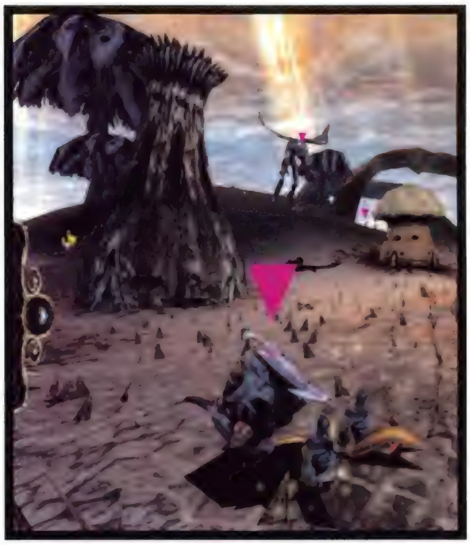
≫

> "...Sacrifice is unlike any RTS you have played."

ⓘ Visually, Sacrifice is awe inspiring, with rich visuals and vivid colouring highlighting a truly unique game world







ⓘ Resource Management occurs primarily through the tapping of mana fountains to create "Manaliths", otherwise known as brown tripods with giant glowing balls of light on top.

ⓘ "Excuse me, you haven't seen a gigantic evil flying creature anywhere have you?"

Getting ready to rumble

Your wizard is ready; you have thrown in your lot with one of five world-ruling deities... now what? Typically, your deity assigns you a mission, just like any other RTS. You commence at your altar (your base). You then create structures or beings to help you fulfill your mission objectives, again just like a RTS. The crucial and key difference is that you're not mining Dysposium 5991 ore on Planet Zarglebot to build your structures and forces, you are using your spiritual force, or mana to create beings which are imbued with personalities of their own, not just hordes of bland drones to do your bidding. You then can reap the fallen souls of your vanquished enemies and gain power, in an effort to Desecrate, thus destroying, your foes altars.

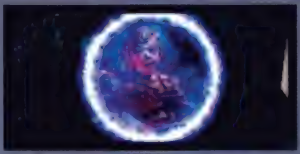
The main difference to a traditional RTS is that not only can your Wizard create structures and armies to do your bidding, but you have some seriously nasty spells you can throw around as well. You will spew fire, move the earth and summon all types of beasties (keen Earthworm Jim fans will be smirking at one of the spells involving an airborne cow... say no more) to do your bidding. This element should not be underestimated – you have the ability to change the tide of battle through your spell casting skills – this kind of direct intervention is something normally sacrificed in favour of pure tactics or weight of numbers in most RTSes.

Trifling annoyances

Sacrifice is not the perfect game, however, but to be fair most of the issues you will have to deal with are either tactically based ones, or the computer AI. The game's structure often means that

Working for the man... or woman

In Sacrifice, you're a wizard who performs tasks/missions at the behest of one of five gods who rule the land in competition with each other. Let's have a look at these worthies and help you make up your mind as to which one suits your Sacrifice style:

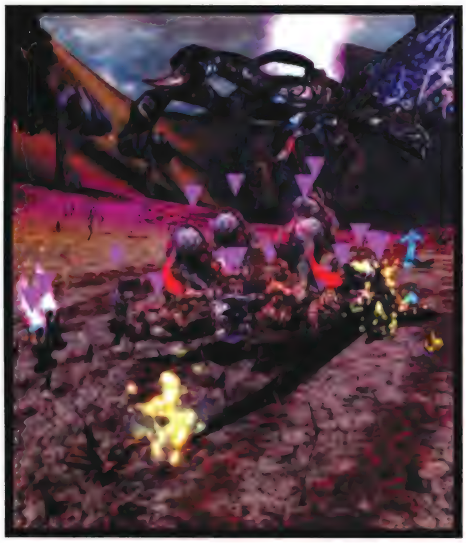


Persephone

The token Earth Mother goddess, Persephone is as close to a druid/cleric as Sacrifice allows. One for all those people who feel compelled to pick Paladins as their RPG player of choice.

Pyro

Pyro, on the other hand, is Mister Bull-in-a-China shop. Did you ever feel a deep emotional chord being struck when you saw Beavis and Butthead's beavis screeching "FIRE! FIRE!"? If the answer if yes, then you're in the right place here.



missions or games can bog down into a standstill-cum-stalemate as Wizards attempting to desecrate far off enemies are weakened too much to effectively control skirmishes and thus lose valuable souls in battle, thereby strengthening their enemies who then visit the same scenario back onto them, and so the process can end up repeating itself for quite a lengthy time.

Additionally, whilst the games visuals are of an extremely high standard (if you have a PC with our recommended spec you will be in for a treat) the view is third person, and the camera is locked onto the Wizard, and can be quite disorienting at first, especially in the heat of battle. That said, perseverance pays its own rewards with Sacrifice, and the period of time it takes to get familiar is time well spent.

For the people who always have found RTSes to be uninteresting, or daunting to get into, Sacrifice offers something new and innovative. By no means is this to say that Sacrifice is an easy game to get into or do well at, but Sacrifice does offer a scaled learning curve and a fresh approach that means that RTS veterans and newbies alike can hope to have a competitive game, on relatively equal footing.

Displaying the kind of production values and polish that only comes from an exceptionally professional outfit, Sacrifice breathes life into an RTS scene that seems to have been waiting for The Next Big Thing to come along. ▢

ⓘ In Sacrifice terms, this equates to a whole world of hurt bearing down on you at a rapid pace.

game details

✓ New twist on RTS genre, Superb graphics engine, Excellent storyline and voice acting, Longevity with map editor and multiplayer

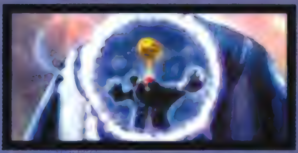
✗ Controls take time to master, Third-person player-centric camera angle takes time to get used to

Minimum Requirements: PII 300, AMD K6 550/AMD K63 450 or higher, 64Mb RAM, 8MB DirectX compatible card, 650Mb HDD
Recommended: Intel Celeron2 600, AMD Athlon 600/AMD Duron 700 or higher, 128Mb RAM or more, 32Mb D3D DirectX compatible – GeForce DDR/GeForce2MX or higher and 650Mb HDD
Sound APIs: DirectSound
Video APIs: Direct3D
Multiplayer: TCP Internet: 4, IPX LAN: 4
NOTE: DirectX 7a at LEAST is required to be installed for Sacrifice, it is included on the CD.

Developer: Shiny Entertainment www.shiny.com
Distributor: Interplay www.interplay.com

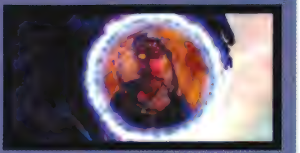
James

James is Shiny's cutesy way of inserting Earthworm Jim into Sacrifice. James is the cloddish God of Earth, which is a nice way of saying he is the God of Dirt. All those earthmoving spells may come in handy if you're rurally inclined.



Stratos

Stratos (voice acted by Tim Curry no less), is the God of Air, and apparently is the closest to a boss figure amongst the gods as is possible. Like to have your enemies wreathed in lightning bolts? Hop aboard the Stratos express.



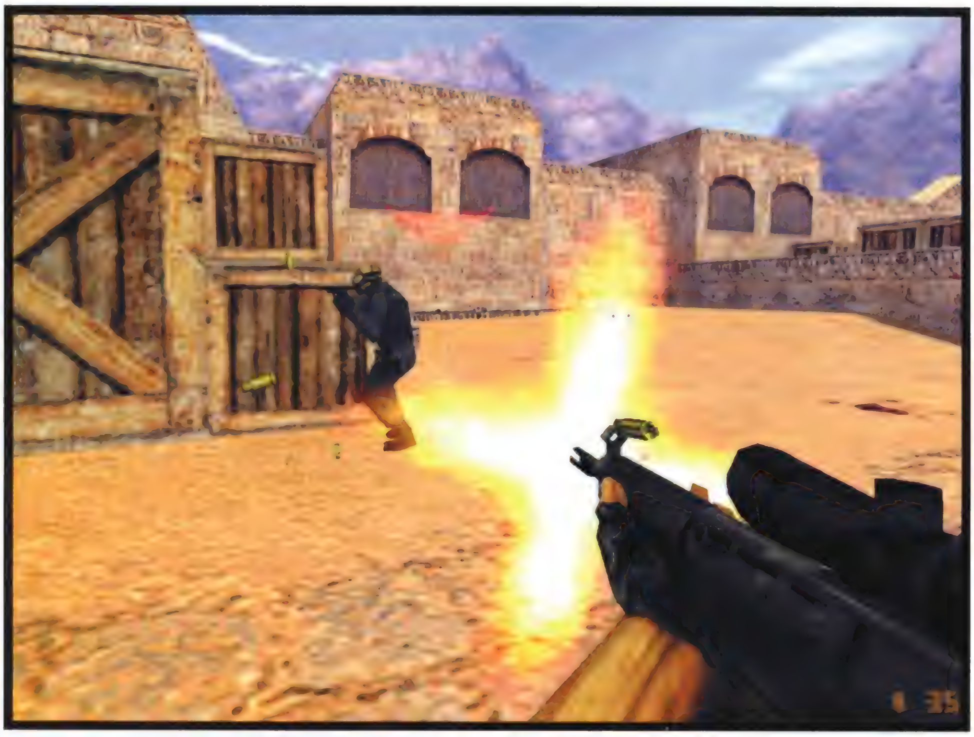
Charnel

Charnel is hands down the most evil god in the game. He's the God of Death, Slaughter, Death, evil deeds, Death, Strife and... death. Did I mention he's the God of Death? If you have ever worn a black t-shirt, Charnel is your man.

atomic
9/10

Half-Life: Counter-Strike

John Gillooly crouches, aims and fires a few shots



Weapons modelling, beautiful map design and high resolution texturing belie the fact that this is essentially a dressed up Quake 2 engine.

> "...the world's most agile counter-terrorists against the bunnyhopping antics of a bunch of terrorists."

In any given week, there are roughly 45,000 people playing Deathmatch Quake 3: Arena and 900,000 people playing Counter-Strike.

Counter-Strike is essentially a one and a half year old modification of a two year old game. Released in its first primitive form in mid 1999, it has taken the online gaming community by storm.

Initially designed as a downloadable free multiplayer mod for Valve Software's Half-Life, Counter-Strike adopts an allegedly real world context, pitting the world's most agile counter-terrorists against the bunnyhopping antics of a bunch of terrorists. The weapons are all real world, the maps are real world, but let's face it, Rogue Spear this aint.

What it is is a highly addictive and fast paced first person shooter. It adopts a game structure of four or five minute rounds, and if you die, you don't respawn until the next one. There are two major game types, Hostage Rescue and Defusion, with a third, Assassination appearing only once.

The reality of this though is that most games degenerate into team deathmatch. Objectives are rarely fought for online outside the rarefied environment of clan matches. And this is the prob-

Linkage

Half-Life Deathmatch and Team Fortress 1.5 are included in the latest Half-Life patches.

Other modifications are available from:

Counterstrike – www.counter-strike.net
Firearms – www.firearmsmod.com
Wanted – www.wantedhl.com
Opposing Force – www.gearboxsoftware.com

Two Australian Counter-Strike Resource sites are:

OzCstrike – www.ozcstrike.com **and**
AXG Half-Life – half-life.axg.net

lem. Online game play usually revolves around single player Rambo runs, the occasional sitting behind a box at one's spawn and lots of accusations of cheating.

Don't expect to be bouncing around blasting rockets left, right and centre. Counter-Strike features real guns as weapons. All in all there are 22 different guns to choose from, starting with a host of pistols and moving through shotguns, submachine guns, assault rifles, sniper rifles and a light machine gun.

Each weapon has its own unique feel and firing pattern. The clue is short bursts of fire. On the other end of this is the locational damage. A whole clip pounded into the body has the same effect as one or two accurately placed headshots.

The true joy of Counter-Strike stems from this, the skills involved in the game develop over time but when it all comes together nothing legal can beat the exhilaration of rushing out and dropping three opponents with well-placed headshots.

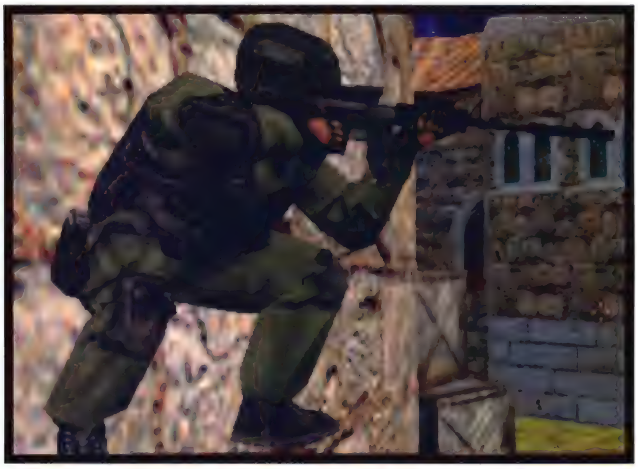
Graphically, this is still the Half-Life a.k.a. heavily modified Quake 2 engine. However Counter-Strike is visually amazing. This is noticeable in both the beautifully textured maps and the little touches like smoke grenades and puffs of smoke caused when bullets hit. Valve Software have been using Half-Life as a test bed for their Team Fortress 2 technology, with the redone network code integrated into the latest patches. This bleeds over into Counter-Strike where the new parametric animation from TF2 is used for the player models.

Other bonuses

This boxed version of Counter-Strike is, in essence a cut down, multiplayer only, version of Half-Life. More specifically it contains Counter-Strike 1.0, Firearms Release Candidate 2.4, Half-Life Deathmatch, Team Fortress 1.5, Opposing Force CTF, Wanted, Ricochet and a single player mod called Redemption.

Front Line Force

The latest and greatest competitor in the Half-Life mod scene is called Front Line Force. Strongly team based and focusing on a capture and hold game model, it is much more fast and furious than Counter-Strike. Basically, in the game, the attacking team has to capture a set number of "command points" and the defending team has to hold out for a set time period. The roles then reverse, keeping the gameplay varied. FLF also features real weapons, but is class based. The emphasis is much more upon fun, and it delivers this in spades. The mod is freely downloadable from www.planethalflife.com/frontline



ⓘ Valve Software's new parametric animation has been incorporated to give a fluid movement to these beautifully detailed models.

Overall for the low price this represents great value if you don't already have Half-Life and aren't worried about single player. However, if you own it then most of the mods are freely downloadable already (see Linkage).

These other mods are good fun, but lack server support for online play. By far the most widely supported ones are Counter-Strike, Team Fortress Classic and Half-Life Deathmatch.

This is a nice package, and shows that with proper support a mod community can thrive and produce truly great games. Counter-Strike is the current standard in multiplayer first person shooters. However if you have Half-Life and don't mind downloading a few hundred megabytes of patches and mods then you don't need to buy the game. ▢

game details

✓ **Fast paced, "real world" gameplay, Great server support, addictive and immersive**

✗ **At heart just a mod, If you own Half-Life it is all downloadable**

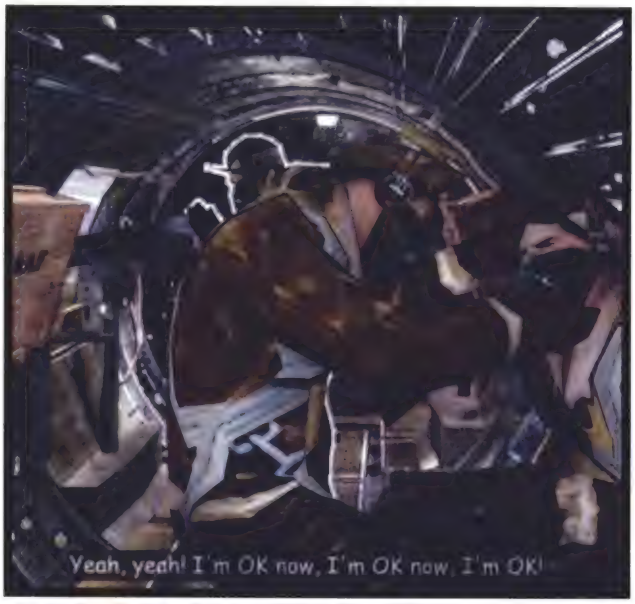
Minimum Requirements: Intel Pentium 233 or AMD K6-2, 32 Mb RAM, 400 Mb HD Space, SVGA, high-colour (16-bit), 28.8+ modem or LAN.
Recommended: Celeron / PIII / Athlon / Duron 500, 128Mb RAM, 400Mb HD Space, 32Mb 3D Accelerator, Broadband Internet connection, A3D or EAX sound.
Sound APIs: A3D, EAX
Video APIs: OpenGL, Direct 3D, Glide.
Multiplayer: TCP/IP, IPX

Developer: Valve Software / Counter-Strike team
Distributor: Jack Of All Games

atomic
8.5/10

B17: The Mighty Eighth

George Soropos pilots the last great flight sim from the MicroProse masters



ⓘ Whilst the battle rages, you need to keep an eye on how your crew is faring, this is a team effort after all.

ⓘ No bomber is an island, and B-17 gives you the flexibility and opportunity to manage a whole Squadron if you are so inclined

B17 crews had one of the toughest jobs in the war. Early on in the allies bombing campaign against Germany, allied B17s went down faster than Rob Lowe's baby sitter and crews rarely lasted longer than twenty missions before succumbing to a burst of flak or the white-hot 20mm shells of a FW190. They didn't, couldn't let up and eventually the arrival of the long range P51 Mustang escort fighter helped turn the tide in their favour.

B17 is unique in the genre of flight simulators as it not only lets you fly the big beast, but also gives the player responsibility for the welfare of crewmates and encourages you to look after them. The game interface is built around three distinct elements: the compartment, action view and instrument view. The compartment view shows the player the inside of each section of the aircraft and the crewmen at their posts. This allows you to give your chaps individual orders - such as putting out a fire, waxing their moustache or tending to a wounded crewmate.

The action view gives access to things like the bombardier's Norden bombsite, gun turrets and the flight controls - all the hands-on stuff. And of course, the instrument view shows you the dials and buttons available to each crewman, with most of the actual B17 controls being active and adjustable. However, if the thought of adjusting fuel pump pressures and elevator trim is a bit much for you, B17 provides the most comprehensive automation possible, basically letting you play it at whatever level you like.

Beginning at the end of 1943 the player can choose to play as either a bomber commander or squadron commander, with the latter giving you control over mission planning and a whole squadron of B17s.

atomic
8.5/10

Fly a fighter

Don't think playing B17 is just about being inside a slow ungainly beast though, you are given access to your escort fighters as well. A quick click on a pop-up menu will allow you to defend your precious bomber and its cargo from a variety of fighters.

Game reviews rarely say much about the audio component in a new title because there's rarely much to say, however, B17 deserves credit for having the best sound ever in a flight simulator.

Though it has taken a while to appear, B17 has certainly lived up to expectations as far as single player gaming is concerned.

game details

✓ Unrivalled level of immersion and realism.

✗ Lack of multiplayer support, unstable with some hardware configurations.

Minimum Requirements: PII 400, 2nd generation video e.g. Matrox G200, TNT etc., 64Mb RAM, HDD min 450Mb
Recommended: Celeron 650 or PIII 600, GeForce 256 or better, 128Mb RAM, HDD 1Gb
Sound APIs: Direct Sound, A3D
Video APIs: Direct3D, has problems with latest NVIDIA drivers, use 6.47 not 7.17 if you use a GeForce based card.

Developer: MicroProse www.hasbrointeractive.com
Distributor: Hasbro www.hasbrointeractive.com

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|3375P34K

Subcultures abound in the wide world of the Web. One bizarre phenomenon is the appropriation of language to what is known as |3375P34K or LeetSpeak as us mere mortals would say.

|337P34K involves the replacem3nt of letters with numbers. There is of course varying degrees of |337ness, up to and including highly advanced variants which utilise brackets and symbols to create an illusion of lettering.

It is a good way to inspire fear in your online gaming foes. When sitting at the top of the frag count nothing inspires respect than a quickly typed "PH34R MY |337 5K|||z" or "| Own j00 4||".

As one becomes more proficient at being |337 it starts to permeate into the rest of one's life. Rather than saying good morning, your greetings will become "Heya J00". After finally managing to get a seat on a peak hour train, you scream at he other commuters "I RoX00r J00 4||, PH34R MY |337 5K|||z".

The cravings are much more insidious. Not content to settle with this basic degree of |337n355, there is a desire to delve much deeper. This usually involves long periods of holding the shift key and bashing numbers to see what works. Brackets become your friend and you start using multiple symbols to replace single letters and even words, for example the humble letter P becomes |>, M becomes |\/|, 'for' becomes 4. Soon you are typing sentences like "|>#34|2 |\/|3 4 | 4|\/| |3373|2 7|-|@|\| j00".

Like any addiction, it just keeps on getting more complex. You find your friends drifting away as they have less and less clue about what you are saying. Rather than return to a world of legible writing the inclination is to move further towards indecipherability.

In a final blast of |337N355, alternative modes of expression may be used, imagine how your friends and enemies will cower in |>|-|34|2 when you hit them with a string of binary. It is then that people will truly give you the respect you deserve and you can truly call yourself 01001100 01000101 01000101 01010100. ○

1337 Sampler

1337	**elite**
J00	**you**
HaX00r	**Hacker**
RoX00r	**Rock**
PH34R	**Fear**
5Klllz	**Skills**
w00t!	**Hooray**

CAPTAIN ATOMIC
DAISY..DAISY..
I'M A HIGH-SPEED MEGAHERTZ KINDA GUY! TELL ME A LITTLE ABOUT YOURSELF...
DAISY..DAISY..
CAPTAIN ATOMIC'S PC INADVERTANTLY BECOMES SELF-AWARE DURING AN AMBITIOUS OVERCLOCKING EXPERIMENT....
MAKING NEW FRIENDS IS ALWAYS FUN!!
Lew

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